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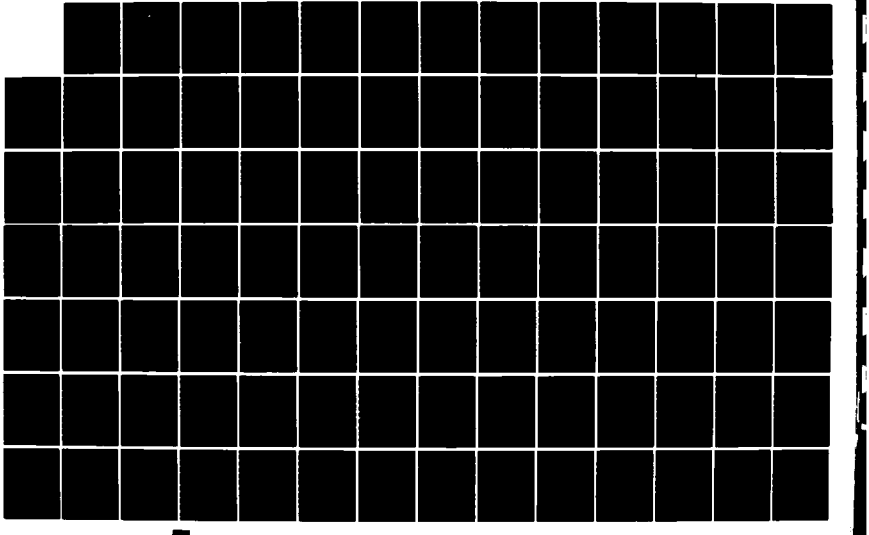

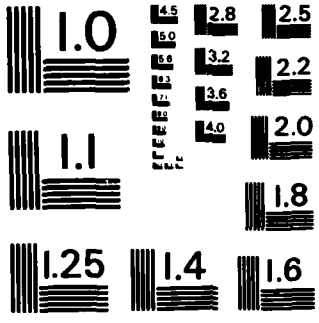

CONTROLLING MEDICAL SUPPLY COSTS

THESIS

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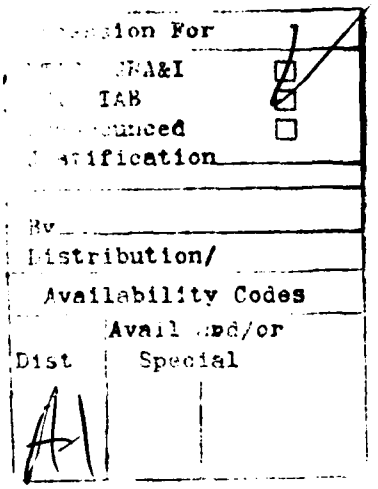

CONTROLLING MEDICAL SUPPLY COSTS

THESIS

Presented to the Faculty of the School of Systems and Logistics

of the Air Force Institute of Technology

Air University

In Partial Fulfillment of the

Requirements for the Degree of

Master of Science in Logistics Management

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Preface

The purpose of this research project was to determine whether or not a standard costing system used at the USAF Hospital, K. I. Sawyer for controlling medical supply costs was an efficient system. Since approximately 30 percent of the Air Force Medical Service's Operation and Maintenance funds are expended annually on medical supplies and with the increased emphasis on the rising costs of health care and the need to justify them, this system offered some possible solutions to the problems of controlling medical supply costs.

To determine if the system was an efficient system, a set of criteria defining an efficient system was established. Productivity factors representative of medical expenditures were selected, a population was defined, and the analysis of the medical supply costs as they related to the productivity factors was conducted for all of the individual hospitals as well as the overall population. Although the findings revealed that the K. I. Sawyer system was an efficient system, further analysis is indicated since the system had only been in operation one fiscal year. A pilot project of at least three years and subsequent analysis of the results is recommended.

In performing this investigation and in the writing of this thesis we are deeply indebted to our faculty advisor, Major Arthur L. Rastetter, for providing the impetus and patient guidance whenever needed. We would also like to thank our reader, Major Jeffery J. Phillips, for his assistance and lended expertise in the area of costing.

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Abstract

This research project investigated the efficiency of a standard costing system used by the USAF Hospital, K. I. Sawyer to control its medical supply costs. This was accomplished by comparing the costs, productivity, and the unit costs associated with the expenditure of medical supplies to those of a population of like medical treatment facilities. The effects of the K. I. Sawyer system were also compared to the medical care component of the consumer price index for all urban consumers in terms of all medical care commodities and prescription drugs.

The analysis was accomplished by defining those productivity factors most representative of the expenditures of medical supplies, defining a population of like hospitals based on the productivity factors selected, and then relating the medical supply costs to the productivity factors. The results of the analysis of the K. I. Sawyer system were then compared against the results of the population average as well as the results of the individual hospitals. Additionally, the results of the K. I. Sawyer system were compared to the inflation rate for the same period.

All of the results of the analysis conducted were obtained to determine whether or not the K. I. Sawyer system was an efficient system based on a set of pre-established criteria defining an efficient system. The findings of this investigation indicate that the K. I. Sawyer system was an efficient system.

CONTROLLING MEDICAL SUPPLY COSTS

I. Introduction

General Issue

A continual increase in health care costs has contributed to the inflation of our economy since 1950. In fact, since 1950, health care costs have risen at four times the rate of the consumer price index (15:51). Additionally, health care more than doubled its share of the Gross National Product (GNP), rising from 4.5 percent of the GNP in 1950 to 10 percent in 1982 (3:669; 8:5).

These cost increases have affected civilian and military health care providers alike. For the civilian sector, Congress has threatened to enact price ceilings if providers are unable to control their rising costs (13:6). For military health care cost increases, Congress has stipulated that money, manpower, and material appropriations will be curtailed in the future without better justification of expenditures.

In addition to cost increases, another side of this issue involves the health care consumer. Neither the general public nor the military community fully appreciates the cost of health care. Civilian consumer ignorance of these costs stems from third-party carriers (health insurance companies) handling most direct payments for health care

and from a substantial majority of those payments being borne, in the long run, by employer-sponsored benefit plans (15:51). As for military consumer ignorance, the military medical service provides direct health care for a nominal inpatient per diem charge only; and, the Civilian Health and Medical Program of the Uniformed Services (CHAMPUS) either makes direct payments to the health care providers or reimburses the military consumer for the majority of the care the military medical service is unable to provide. Yet, both civilian and military health care consumers continually clamor for quality health care as evidenced by the substantial increase in medical malpractice lawsuits and subsequent cash settlements in and out of the military (17:60).

In answer to this outcry for quality health care and justice, medical technology has advanced rapidly, but not without a price tag (5:104). Whether it is through a third-party carrier or an employee benefit plan, the health care consumer in the civilian sector pays the price. In the military, health care providers must obtain funding based on the justification of the use of those funds; therefore, in essence they bear the burden of this price tag.

In short, the control of health care costs has gained paramount importance for civilian and military health care providers alike. However, for military providers who do not have the benefit of consumers to bear the burden of costs, the problem of controlling costs assumes a whole new dimension.

Specific Problem

Approximately 30 percent of the Air Force Medical Service's Operation and Maintenance (O&M) funds are expended annually on medical supplies, Element of Expense Investment Code (EEIC) 604. The responsibility for controlling these funds at the user level rests with individual medical treatment facility (MTF) resource management offices (RMOs). Unfortunately, no formalized method of controlling medical supply costs exists at the RMO level.

A method of controlling medical supply costs which integrated existing productivity measurements into a standard costing system was implemented at the USAF Hospital, K. I. Sawyer with effective fiscal year (FY) 82 results (see Appendix A for an outlined description of the system's development, operations, and benefits as well as local forms, form letters, and reports used). Using this system, a .97 percent reduction in medical supply expenditures was realized despite an 11.88 percent and 6.49 percent increase in occupied bed days and outpatient visits, respectively, from 1981 fiscal year levels as well as a 10.01 percent and 11.73 percent inflation rate for FY 82 for all medical care commodities and prescriptions drugs, respectively (14:72).

Even though the system appears to have been effective based on the aforementioned results, comparisons of this system to other systems used have not been made to determine if it was also a more efficient means of controlling medical supply monies. Therefore, the problem to be addressed by this research project is to determine if the K. I. Sawyer standard costing system is a "better mousetrap" to use for medical supply funds control.

Background

Prior to the development and implementation of the medical supply standard costing system at the USAF Hospital, K. I. Sawyer, the Resource Management Office (RMO) was able to exert little to no control over the spending practices of the cost center managers (CCMs). Whenever the CCMs exceeded their targets, they were required to submit written justifications for their overexpenditures to the RMO. Unfortunately, the RMO had little to no means of validating or refuting the CCMs' justifications because the RMO could not assess how much the CCMs should have spent. Additionally, because there was no means of forecasting the cost centers' future needs, the RMO generally established cost center targets by either asking the CCMs for an estimate of their future needs or by applying the CCMs' percentage of total expenditures for the past period to the amount of available monies for the future period. In most cases, to estimate their future needs the CCMs added an indiscriminant percentage of their historical expenses to those expenses to account for any future inflation and to provide a buffer for any unanticipated needs or poor spending practices. Without fail, the total estimated future needs of the CCMs always exceeded the amount of available monies. Subsequently, a tradeoff between what the CCMs said they needed and a percentage of the available monies the RMO could afford them was generally the means by which future targets were established. Hence, the RMO was unable to reactively, nor proactively control the spending of medical supply monies.

Scope

Due to the uniqueness of the mission of the Air Force Medical Service, its funding needs are appropriated and kept segregated from other Air Force funds under the Air Force Resource Management System's Major Force Program (MFP) 8B. As a result, Air Force Medical Service responsibilities include the allocation, expenditure, and control of its funds from the headquarters level to the lowest functional workcenter (cost center) in need of funds.

For accounting and other related purposes, MFP 8B funds are categorized and/or divided and subdivided into coded accounts and subaccounts according to such criteria as the particular MTF, specific funding element, type of expenditure, and cost center involved. The scope of this research project covers the allocation, expenditure, and control of Element Expense Investment Code (EEIC) 604, Medical Supply, funds to MTF cost centers. The main emphasis, however, deals with the control of these funds.

Research Objective

The continual increase in health care costs since 1950 and the anticipated future increases have generated an increased interest in health care costs by Congress and the public at large. It is evident that an effective as well as efficient method of controlling these costs is needed by both the civilian and military sectors alike. While the discussion of this issue is too vast for the purpose and scope of this study, the control of Air Force medical supply expenditures on the user level is not. The K. I. Sawyer method appears to be effective in

theory and in practice in terms of controlling costs and providing a means of justifying expenditures; however, the question of its efficiency remains unanswered. Therefore, the basic objective of this study is to determine whether or not the K. I. Sawyer method is an efficient system.

Research Question

The basic question addressed in this research project is, Was the USAF Hospital, K. I. Sawyer standard cost control method an efficient system as defined by established criteria and verified by analysis of the results of like USAF MTFs? In answering this question, the following questions will be answered, in turn:

1. What MTFs should be used as a basis of comparison?
2. What are the most pertinent factors to compare?
3. What constitutes an efficient system?

II. Literature Review

Introduction

As previously mentioned, the essence of the method proposed and implemented at the USAF Hospital, K. I. Sawyer is based on establishing cost control through the use of productivity factors as a measurement tool. In reviewing available literature, no similar governmental studies were discovered. However, several texts, journal articles, and studies supported the application of similar methods within the civilian sector. This chapter will present the K. I. Sawyer method in detail along with some of the ideas on cost analysis, productivity factor selection, and participative cost control as advocated by other sources in addition to some of the more recent studies conducted in this area.

K. I. Sawyer System

To gain better control over medical supply monies, a standard costing system was used. The basic premise of this system was that a direct relationship existed between the expenditure of medical supply monies and the amount of medical services provided (i.e., patients treated, operations performed, drugs dispensed, etc.). Therefore, productivity factors most representative of the medical supplies being expended were used to establish cost standards by which actual expenditures could be judged against and by which future needs could be determined throughout the fiscal year. The cost standards, therefore,

provided the basis for the control of the medical supply monies reactively as well as proactively.

Appendix A contains an outline of the K. I. Sawyer system in terms of its development, operations, and benefits as well as the forms, form letters, and reports that were used in the operation of the system. The remainder of this section explains the development, operations, and benefits of the K. I. Sawyer standard costing system.

The following steps were carried out in the development phase of the standard cost system:

1. The determination of a representative productivity factor for each cost center.
2. The compilation of historical expenses and historical productivity levels for each cost center.
3. The computation of historical unit costs for each cost center.
4. The establishment of standard unit costs for each cost center.
5. The development of administrative aids and guidelines and the training of CCMs.

In doing so, the basis for the control of medical supply monies -- the standard unit cost -- was established.

System Development. The initial development step of the system involved determining what productivity factors best represented each cost center's medical supply expenditures. Because numerous productivity factors were already being tracked through the Report of Patients Program (AFM 168-695, Vol I, Medical Administrative Management System - Base; AFR 168-4, Medical Administration), the Uniform Chart of Accounts Program (DOD 6010.10-M, Department of Defense Uniform Chart of Accounts for Fixed Military Medical and Dental Treatment Facilities), and the Uniform Staffing Methodologies Program (DOD 6010.11-M, Uniform

Staffing Methodologies for Fixed Military Medical and Dental Treatment Facilities) as well as other information systems, it was not necessary to establish another information system to meet the needs of the standard costing system. All productivity factors used were taken from one of the aforementioned information systems. As to which single productivity factor was best representative of the medical supply expenditures for each cost center, this was jointly determined by the individual CCMs and the RMO.

Once having determined which productivity factors to use, historical expenses and historical productivity levels for the same periods of time were used to compute a historical unit cost for each cost center. The unit costs were computed as follows:

$$E_x \div W_x = UC_x$$

where:

E_x = medical supply expenditures for period x

W_x = workload or productivity level for period x

UC = unit cost for period x

Using the historical unit costs, the RMO and individual CCMs jointly established a standard unit cost for each representative cost center. In doing so, the CCMs in essence agreed to not spend over the standard unit cost. The RMO, on the other hand, agreed to support or allocate monies to the CCMs on the basis of the established standard unit cost. More importantly, the RMO, at this point, maintained some proactive control over the monies by participating in the establishment of the standard unit costs or the expected level of future spending.

Aside from the development of administrative aids and guidelines, and the training of the CCMs (i.e., forms, form letters, reports, the orientation of the CCMs to the system, etc.), the development phase of the system was complete at this point.

System Operations. Having established the standard unit cost for each cost center, projections of future expenses could be made. The CCMs projected their quarterly medical supply expenditures prior to each quarter by simply multiplying their projected workload (that single productivity factor most representative of each cost center's medical supply expenditures) for each month of the quarter times their established standard unit cost.

$$PW_m \times UC = PRE_m$$

where:

PW_m = projected workload for the month; and,
m = month of the quarter {1,2,3}

UC = established standard unit cost

PRE = projected routine expenditures for the month; and,
m = month of the quarter {1,2,3}

Because each cost center's established standard unit cost was determined using historical expenditure figures and productivity levels, items which were new and/or had not been included in previous expenditures were considered unique expenditures. Projected unique expenses were obtained for each month by each CCM by summing the cost(s) of the unique item(s) that were expected to be expensed to the cost center during that particular month of the quarter.

$$\sum_{n=1}^{y} EC_{n,m} = PUE_m$$

where:

$\sum_{n=1}^{y} EC_{n,m}$ = expected cost;
y = total number of unique items in a month;
n = number of the item {1,2,3,...}; and,
m = month of the quarter {1,2,3}

PUE_m = projected unique expenses for the month; and,
m = month of the quarter {1,2,3}

Having determined the monthly projected routine and unique expenditures for each month of the quarter, the total projected combined expenditures for each month were then obtained by adding each month's projected routine expenditures to the month's projected unique expenditures; and then, the total projected combined expenditures for each month of the quarter were summed to obtain the total projected combined expenditures for the quarter.

$$PRE_m + PUE_m = TPE_m$$

where:

PRE_m = projected routine expenses for the month; and,
m = month of the quarter {1,2,3}

PUE_m = projected unique expenses for the month; and,
m = month of the quarter {1,2,3}

TPE_m = total projected combined expenses for the month; and,
m = month of the quarter {1,2,3}

and

$$TPE_1 + TPE_2 + TPE_3 = TPE_q$$

where:

TPE_q = total projected combined expenses for the quarter; and,
q = quarter of the fiscal year {1,2,3,4}

If the total projected combined expenditures for the quarter were reasonable based on historical expenditures, the cost centers were funded for the quarter at that amount. If the projections were unreasonable, the RMO would meet with those CCMs and jointly work out any discrepancies. As such, the RMO maintained proactive control.

Each month the actual expenditures or dollars spent by each cost center were compared against what each cost center should have spent based on its productivity. To determine what each cost center should have spent or earned for the month, the established standard unit cost was multiplied times the actual workload for the month. To allow for slow as well as peak months, this was also accomplished on a cumulative or year-to-date (FY) basis.

$$AWL_{m(c)} \times UC = DE_{m(c)}$$

where:

$AWL_{m(c)}$ = actual workload for the month or cumulative, year-to-date period;
m = month of the fiscal year {1,2,...,12}; and,
c = cumulative months of workload year-to-date {2,3,...,12}

UC = established standard unit cost

DE = dollars earned for the month or cumulative, year-to-date period;
m = month of the fiscal year {1,2,...,12}; and,
c = cumulative months of dollars earned year-to-date {2,3,...,12}

A comparison of the actual expenditures or dollars spent by each cost center against what each should have spent based on its productivity was then made. This was accomplished by first subtracting any unique expenditures, which could be substantiated using the monthly Activity

Issue/Turn-In Summary which shows all medical supply expenditures by item for each cost center, from the dollars spent. The resulting difference was then divided by the dollars earned, multiplied times 100 and subtracted from 100 to obtain a $\pm$ percentage variance. This, too, was accomplished on a cumulative or year-to-date FY basis.

$$(DS_{m(c)} - UE_{m(c)}) \div DE_{m(c)} \times 100 - 100 = \pm\%$$

where:

$DS_{m(c)}$ = dollars spent for the month or cumulative, year-to-date period;
m = month of the fiscal year {1,2,...,12}; and,
c = cumulative months of dollars spent year-to-date {2,3,...,12}

$UE_{m(c)}$ = unique expenses for the month or cumulative, year-to-date period;
m = month of the fiscal year {1,2,...,12}; and,
c = cumulative months of unique expenses year-to-date {2,3,...,12}

$DE_{m(c)}$ = dollars earned for the month or cumulative, year-to-date period;
m = month of the fiscal year {1,2,...,12}; and,
c = cumulative dollars earned year-to-date {2,3,...,12}

$\pm\%$ = plus or minus percentage variance between what was spent and what should have been spent based on productivity levels

Since the established standard unit cost for each cost center was based on cumulative historical unit costs and because the established standard unit costs were intended to be used as expenditure targets until there was a need to adjust them, the CCMs were asked to justify their overexpenditures if the $\pm$ percent year-to-date variance was greater than 5 percent. The +5 percent ceiling was arbitrarily chosen based on the RMO never wanting to be more than $25,000 off target. With the previous FY 81's weekly medical supply expenditures having

The projected workload variances indicated how well the CCMs were projecting their workload. The projected expense and unit cost variances indicated how close actual expenses and unit costs were to what was projected. These were used to determine whether or not the established standard unit cost needed adjusting upwards or downwards. This allowed for the fine tuning of the system. While no variance ceilings were established, ceilings could have been used dependent on the cost centers' predictability of workloads, the RMO's willingness to tolerate inconsistencies, etc.

The prior FY workload variances were used to ascertain increases and decreases in workload which could indicate a possible need for additional funds. The prior FY expenses and unit cost variances were also used to determine whether or not the established standard unit costs (which were based on historical data) were still a valid standard.

If a change in an established standard unit cost was justified based on the CCM's explanation of overexpenditures and/or the aforementioned analysis, the CCM and RMO again jointly determined what it should be. However, changes were not made without justification.

Lastly, a report of each cost center's monthly and year-to-date expenditures and variances was forwarded to each respective CCM; and, a program-wide report showing all of the cost center's year-to-date expenditures and variances was forwarded to the Hospital Commander for review and subsequent necessary action.

Cost Analysis

In establishing an effective cost control program, it is essential that certain prerequisites be established prior to operation.

> There are five prerequisites a cost analysis system should meet if its function is to be fulfilled and if it is to operate efficiently.
>
> 1. There should be an organization chart and a chart of accounts relating to it.
>
> 2. There should be an identification of cost centers as either general service cost centers or as final cost centers to which all costs are ultimately assigned.
>
> 3. There should be an accurate accounting system capable of accumulating financial data by cost center.
>
> 4. There should be a comprehensive information system capable of collecting nonfinancial data by cost center and by the total hospital providing: (a) the basis for distribution of costs from general service centers to final cost centers, and (b) the basis for calculating unit cost by final cost center.
>
> 5. A methodology for cost analysis should be chosen which is most practicable for the hospital situation [3:125].

The USAF Hospital, K. I. Sawyer program meets these prerequisites largely through the requirements of the Air Force Resource Management System, the Report of Patients Program (AFM 168-695, Vol I; AFR 168-4), the Uniform Chart of Accounts Program (DOD 6010.10-M), and some of the mechanics of the program itself. However, these prerequisites emphasize only the importance of establishing good cost accounting procedures. There is no mention of who should be responsible for implementing such a program or how the costs will actually be controlled.

> The absence of a single satisfactory overall measure of performance that is comparable to the profit measure is the most serious problem inhibiting the development of effective management control systems in non-profit organizations [2:7].

Therefore, the next step is to involve the personnel in establishing the cost control standards. As was stated so aptly by Dr. Bisbee (4:120), Chairman of the Task Force on Financial Management of the Association of University Programs in Health Administration,

> This is the design of systems to encourage careful management of day-to-day expenditures at the department head level. Such systems involve adopting a standard for departmental performance and the frequent comparison of actual achievement against the standard.

Productivity Factor Selection

There were several cost analysis plans presented by various authors that emphasized the development of standards, management involvement and the prerequisites outlined by Berman. One such plan implemented by Dr. Suver and Dr. Helmer was based on establishing a flexible budget model to control costs (16:34). In developing this model, they focused their interest on nursing salaries because of the relative importance of salaries to the overall operating budget. Utilizing regression forecast models with salaries being the dependent variable and such variables as admissions, patient days and time being the independent variables, they attempted to predict nursing salaries based upon historical costs and workload data (16:36). In doing so, they established productivity factors on which to base nursing costs. "The cost prediction models that were developed provide the nursing supervisor with monthly and yearly nursing salary predictions for two major wards as a function of workload [16:36]." The results of the model revealed the definite potential for application within the entire hospital environment. In short, models forecasting nursing salary as

accurately as those described in this article can serve as a powerful tool for the administrator to employ a flexible hospital budget tied to workload projections.

The successful use of budget models was actually demonstrated by General Hospital, a non-profit community hospital located in Massachusetts (10:44). As reported by Susan Larracey in 1980, this hospital instituted a financial planning model (HOFPLAN) to help control costs and predict future financial needs. "HOFPLAN simulates changes in hospital operations resulting from changes in occupancy rates, lengths of stay, service mixes, and service rates associated with different patient types [10:44]." The plan is based on an operations module which simulates patient services operations, future projections, and a financial module which provides the financial reports and comparisons (10:45). However, the basis for controlling costs was, like K. I. Sawyer, through the use of cost centers. "HOFPLAN is a financial planning tool that forecasts the increases or decreases for future planning purposes [10:47]." Though this is a more sophisticated method of monitoring and controlling costs than that employed by K. I. Sawyer, it too, is based on estimating the average productivity factors that can be used to simulate the hospital environment and predict costs.

In yet another cost analysis plan presented by Schlag, the emphasis was once again placed on the importance of cost center management to control costs. He stressed the need to carefully allocate appropriate costs to the correct cost center through the use of predetermined standards (12:56). "Do not merely follow the

statistical allocation bases of the preceding year [12:56]." The goals of each cost center in management cost analysis must be to review all costs incurred each year and to determine where the potential for improvements and a more efficient system lie. Therefore, in order to really understand the total hospital costs, each cost center and how they incur their respective costs must be understood.

The above articles addressed two important facets of a good cost control program -- the development and use of workload factors associated with costs and the involvement of cost centers. The K. I. Sawyer system contains both of these facets.

Another important factor that is being given more press as a major contributor essential for an effective cost analysis program within nonprofit organizations such as hospitals is variance analysis. According to Anthony and Young (2:57) in Management Control in Nonprofit Organizations,

> The analysis of variances between standard costs and actual costs according to the cause of the variance (e.g., volume, mix, price, efficiency) is a fairly recent development in business practice, although it has been described in textbooks for 30 years or more. Such an analysis provides a powerful control tool, which is not available to organizations that do not have standard costs.

They felt that proper classification of costs according to the productivity factors which define the expenditures most accurately can be especially useful to nonprofit organizations and stated that presently this is rarely being accomplished.

In order to make these comparisons, some measure of productivity must be established. This can be especially difficult within a

hospital setting because no two hospitals are alike and services change and some services exist only as support for others. "Calculations of productivity in the hospital require that services as well as work activities be measured [18:29]." However, as indicated by several articles, "Measures of productivity represent the amount of physical output produced divided by the physical amount of resources applied or simply, output divided by input [11:25]." Based on this definition, the hospital department head must establish what represents the output and the input in terms of production units. "It is most important, in the selection of a production unit, that the unit accurately identify and reflect the service or commodity produced and the amount of health care resources used to produce an individual unit [9:77]." "In short, the process of aligning responsibility with controllability and developing a control structure within an organization's broader organizational structure is by no means a simple endeavor [2:7]."

What a certain department head chooses as representative of productivity depends on the past and future workload. The American Hospital Association has published a booklet entitled Uniform Hospital Definitions which provides some useful measurement definitions. An example of these are as follows (18:22):

Department	Occasion of Service
Anesthesiology	Number of patients
Basal Metabolism	Hours of administration and use
Blood Bank	Number of 500-cc units prepared for transfusions

Department	Occasion of Service
Central Supply	Dollar value of processed requisitions
Delivery Rooms	Number of deliveries
Dietary	Number of meals served
Electrocardiology	Number of examinations
Housekeeping	Hours of service rendered to various departments
Inhalation Therapy	Number of hours that oxygen is administered
Laboratory	Number of tests
Laundry	Pounds or pieces of laundry processed
Nursing	Hours or days of service
Occupational Therapy	Hours of teaching and supervision
Operation of Plant	Thousands of pounds of steam produced, plus pounds of ice manufactured, plus kilowatt hours of electricity produced
Operating Rooms	Number of operations
Pharmacy	Dollar value of prescriptions and requisitions processed
Physical Therapy	Number of treatments
Postoperative or Post-anesthesia Recovery Rooms	Number of patient hours of service
Radiology/Diagnostic	Number of films taken, plus number of fluoroscopic examinations
Radiology/Therapeutic	Number of x-ray treatments, plus number of radium implementations, plus number of treatments by radioactive elements

Once the measure of productivity is defined, comparative measures can be used to facilitate the establishment of performance goals or the levels of quality that should be produced in a period (18:22).

"Comparative measures can be obtained in a variety of ways such as comparison of the same data over a certain period is one approach; comparison of data with those of other hospitals is another [18:22]." "Data on cost and manhour can be obtained through such programs as the American Hospital Associations Hospital Administrative Services (HAS) [18:22]." Once these measures have been acquired, the important ingredient is personnel involvement in managing the program.

Participative Cost Control

In order for the cost control program to be effective, it must have the support of the personnel in each department. They must be made aware of the productivity factors which control the budget allocations allotted their unit. Ideally, the department head has established productivity factors after consulting with his employees. "Establishment of precise measures tends in itself to increase productivity, conceivably because the increased attention to production levels causes the worker to want to produce more [18:23]." This is commonly known as the "Hawthorne effect" from the sociological studies conducted during the twenties and thirties. Subsequent studies have shown that "if individuals are allowed to participate in decision making, the hospital will realize a greater economic payoff than it would were it to resort to more authoritative styles [7:43]."

At the University Community Hospital in Tampa, Florida, the department directors and the staff have been directly involved with developing and controlling the budget (7:43). The approach has been very successful and their budget projections have proven extremely

accurate. Though the Air Force MTFs are not profit motivated, the participative approach can be helpful in reducing and controlling costs and is highly recommended through the Resource Management System.

Illinois Hospital Association Project

The combined approach to cost control through personnel involvement and establishment of productivity factors was also successfully tested in a project sponsored by the Illinois Hospital Association. Four Chicago area hospitals participated in the project conducted from 1978 to 1980. "The purpose of this project was to design and test a system framework which would integrate clinical, financial and productivity information and provide a basis for understanding, monitoring, and controlling hospital costs productivity [1:36]."

"The system framework involved linking two components of hospital output: patient service and case type [1:36]." The patient service was measured in terms of a Patient Care Unit (PCU). This unit allowed relating cost information to the specific clinical activity to which it was associated. However, this measure didn't adequately account for cost differences in individual case treatments. Therefore, an additional measurement factor known as Diagnosis Related Groups (DRGs) was introduced. "DRGs are classes of patients with similar demographic, diagnostic, and therapeutic characteristics who, therefore, are expected to consume the resources of the hospital in a similar manner [1:37]." Together, these two measures were used as the basis for interhospital comparisons, planning purposes, and measuring and evaluating departmental performance costs and productivity.

After a two-month test period, the findings were reported:

> The DRG-PCU system effectively provides periodic performance reports to administrative management and clinical management documentary variances between planned and actual volumes of productivity costs, labor costs, equipment and facility utilization, etc. [1:38].

The program achieved its objective of integrating cost information, clinical diagnosis, and productivity data into an effective cost controlling system. The reaction to the change was favorable at all four participating hospitals (1:38). "The PCU cost accounting technique identifies the costs of patient services more effectively than traditional methods [1:38]."

American Hospital Association

The idea of assigning productivity factors to aid in cost control is not a new idea. The American Hospital Association published an introductory handbook in 1973 entitled The Management of Hospital Employee Productivity. This handbook readily endorses the establishment of performance measures for each hospital department based on a predetermined production unit. It provides general guidelines with tools and techniques described on how to do just that. It is also a proponent of active employee participation in cost control. As was stated, "effective communication and employee participation are the keys to better management of employee productivity [18:55]."

Conclusion

The unique case-by-case service oriented environment of hospitals has made establishing effective cost control programs difficult. "Traditional product cost techniques are not really applicable to the typical service organization, and, as a result, attempts to apply these techniques have been disappointing [6:133]." However, the review of available literature has revealed that the use of productivity factors to aid cost control has been successfully instituted in several hospitals and offers a viable alternative to the more traditional methods.

> Spurred on by public concern about the rising cost of health care and by the necessity for justifying their fees on the basis of a plausible measurement of cost, and led by the American Hospital Association, the Hospital Financial Management Association, and the Congress of Hospital Administrators, many hospitals have made dramatic improvements in their cost accounting systems in recent years [2:59].

III. Methodology

Introduction

No formalized method of controlling medical supply costs exists at USAF MTFs at the cost center (user) level. A standard costing system implemented at the USAF Hospital, K. I. Sawyer revealed positive, effective results for fiscal year (FY) 82. However, the overall efficiency of the method remained to be substantiated. To determine whether or not the K. I. Sawyer system was efficient, the system's results were compared against those of like USAF MTFs. This involved defining a population of like MTFs grouped according to bed size as well as defining common productivity factors that best accounted for medical supply costs within the population, and establishing criteria as to what constituted an efficient standard cost control system. After establishing the criteria, data was collected for each population MTF for FY 82, and comparisons of the criteria and the collected data were made. From the comparisons made, conclusions as to the efficiency of the USAF Hospital, K. I. Sawyer method were drawn and any recommendations that could be made from the conclusions were given. In so doing, the following research question was answered: Was the USAF Hospital, K. I. Sawyer standard cost control method an efficient system as defined by the established criteria and verified by analysis of the results of like USAF MTFs?

Population Defined

To define the population, a variety of avenues were explored in terms of how hospitals may be classified into like groups, the applicability of these classifications to the military health care environment, and the purposes of this research project. Among the avenues explored were the review of various medically related Department of Defense (DOD) and Air Force regulations and manuals; the review of current literature concerning hospital cost controls, productivity, cost accounting, program budgeting, government accounting, historical cost accounting, and program budgeting to name a few; and consultations with AFIT School of Systems and Logistics faculty.

The most applicable means for defining this research project's population came from the review of DOD and Air Force regulations. The other avenues explored applied only in a general sense in contrast to the more specific applications found in the DOD and Air Force regulations.

The method decided upon came from DODI 6015.17, "Technical Procedures and Criteria for Planning and Acquisition of Military Health and Medical Facilities." On a biannual basis the HQ USAF Office of Medical Manpower (SGHM) uses the DODI 6015.17 method to update the USAF Fixed Medical Treatment Facilities bed list (dated 1 January and 1 July) which lists all USAF fixed MTFs and the number of beds each facility is authorized to operate. In the classification of DOD medical centers and hospitals, DODI 6015.17 prescribes a formula for medical centers and another for hospitals. For hospitals, the formula is as follows:

$$BD_x \div D_x = ADPL_x$$

where

BD_x = occupied bed days in period x

D_x = number of days in period x

$ADPL_x$ = average daily patient load for period x

DODI 6015.17 also prescribes that hospitals be categorized in increments of five (i.e., 15, 20, 25, etc.). If the ADPL is 75 percent or greater than the next highest increment, the increment above that increment is assigned as the number of operating beds authorized.

$$ADPL_x \div I \times 100 = AB\%$$

where

$ADPL_x$ = average daily patient load for period x

I = next highest increment

AB% = percentage of operating beds authorized

For example, a hospital having 5,069 occupied bed days in a period of one year is classified as follows:

$$5{,}069 \div 365 = 13.89$$

$$13.89 \div 15 \times 100 = 92.6\%$$

Since the percentage is greater than 75 percent of the next highest increment (15), the hospital would be authorized to operate 20 beds.

The bed list dated 1 January is compiled using total occupied bed days for the previous 1 October through 30 September one-year period and the 1 July bed list uses the total occupied bed days for the previous 1 April through 31 March one-year period. Since the K. I.

Sawyer method of cost control was used during FY 82, the 1 January 83 bed list was used as the starting point for defining the population. Since additional factors besides the ADPL weigh into the productivity of a hospital (i.e., outpatient visits, prescriptions dispensed, births, number of surgical operations, etc.), and since K. I. Sawyer was authorized 25 operating beds, it was decided that all hospitals in the 20 to 30 authorized operating bed range would be used as an initial population (see Table 1).

At this point, so as to better define the population and insure it was as valid and reliable as possible, the productivity factors considered most significant for testing the effectiveness and efficiency of the K. I. Sawyer method were determined. (See next section, "Productivity Factors Defined.") Having defined the productivity factors as being occupied bed days, outpatient visits and prescriptions dispensed, data for the initial population were obtained. The mean and standard deviation for each factor were statistically derived. Then z-scores for all of the factors for each hospital in the initial population (see Tables 2, 3, and 4) were calculated. Those hospitals with z-scores of one standard deviation or less were selected as well suited for testing and comparison of data to K. I. Sawyer (see Table 5). Those twelve represent the bases selected as the final population as defined for this research project.

Productivity Factors Defined

Once having defined the population, those productivity factors that best measure the performance of the hospital population as a

TABLE 1

Initial Population

Hospitals	Operating Beds Authorized	Hospitals	Operating Beds Authorized
Altus	25	Little Rock	30
Beale	30	Loring	20
Bergstrom	25	Moody	25
Blytheville	25	Mt. Home	30
Castle	30	Myrtle Beach	20
Columbus	20	Patrick	25
Edwards	20	Plattsburgh	20
Ellsworth	30	Reese	20
England	20	Robins	30
F. E. Warren	25	Seymour Johnson	30
George	25	Williams	25
Griffis	20	Wurtsmith	20
K. I. Sawyer	25		

TABLE 2

Initial Population Productivity Factors for FY 82

Hospitals	Occupied Bed Days	Outpatient Visits	Prescriptions Dispensed
Altus	5,877	94,746	128,078
Beale	7,809	103,677	146,982
Bergstrom	5,880	125,266	325,490
Blytheville	5,498	77,857	114,987
Castle	7,018	126,248	197,345
Columbus	4,345	72,705	181,648
Edwards	4,600	80,752	103,665
Ellsworth	7,917	116,587	173,327
England	5,408	91,188	142,823
F. E. Warren	6,841	93,880	105,429
George	6,840	121,990	157,553
Griffis	4,229	85,708	109,623
K. I. Sawyer	6,264	84,020	99,894
Little Rock	7,758	172,692	322,171
Loring	4,303	61,574	62,408
Moody	5,959	83,849	161,347
Mt. Home	7,070	82,524	144,641
Myrtle Beach	5,094	85,204	146,463
Patrick	5,841	140,618	358,079
Plattsburgh	4,466	74,863	104,217
Reese	4,793	77,568	129,567
Robins	7,589	158,372	247,446
Seymour Johnson	8,132	139,922	321,152
Williams	6,069	118,052	178,169
Wurtsmith	4,927	70,377	81,886
Including K. I. Sawyer's Data:			
μ	6,021.08	101,609.56	169,775.60
σ	1,231.62	28,829.24	80,603.51
R	3,903	111,118	295,671
Excluding K. I. Sawyer's Data:			
μ	6,010.96	102,342.46	172,687.33
σ	1,256.00	29,194.64	80,967.13
R	3,903	111,118	295,671

TABLE 3

Productivity Factor Z-Scores for Initial Population
Including K. I. Sawyer's Data

Hospitals		Occupied Bed Days	Outpatient Visits	Prescriptions Dispensed
Altus	*	-.117	-.238	-.517
Beale		1.452	.072	-.283
Bergstrom		-.115	.821	1.932
Blytheville	*	-.425	-.824	-.680
Castle	*	.809	.855	.342
Columbus		-1.361	-1.003	.147
Edwards		-1.154	-.723	-.820
Ellsworth		1.539	.520	.044
England	*	-.498	-.361	-.334
F. E. Warren	*	.666	-.268	-.798
George	*	.665	.707	-.152
Griffis		-1.455	-.552	-.746
K. I. Sawyer	*	.197	-.610	-.867
Little Rock		1.410	-2.466	1.891
Loring		-1.395	-1.389	-1.332
Moody	*	-.050	-.616	-.105
Mt. Home	*	.852	-.662	-.312
Myrtle Beach	*	-.753	-.569	-.289
Patrick		-.146	1.353	2.336
Plattsburgh		-1.263	-.928	-.813
Reese	*	-.997	-.834	-.499
Robins		1.273	1.969	.964
Seymour Johnson		1.714	1.329	1.878
Williams	*	.039	.570	.104
Wurtsmith		-.888	-1.083	-1.090

* Hospitals within $\pm$ 1 standard deviation.

TABLE 4

Productivity Factor Z-Scores for Initial Population
Excluding K. I. Sawyer's Data

Hospitals		Occupied Bed Days	Outpatient Visits	Prescriptions Dispensed
Altus	*	-.107	-.260	-.551
Beale		1.432	.046	-.317
Bergstrom		-.104	.785	1.887
Blytheville	*	-.408	-.839	-.713
Castle	*	.802	.819	.305
Columbus		-1.326	-1.015	.111
Edwards		-1.123	-.740	-.852
Ellsworth		1.518	.488	.008
England	*	-.480	-.382	-.369
F. E. Warren	*	.661	-.290	-.831
George	*	.660	.673	-.187
Griffis		-1.419	-.570	-.779
K. I. Sawyer				
Little Rock		1.391	-2.410	1.846
Loring		-1.360	-1.396	-1.362
Moody	*	-.041	-.633	-.140
Mt. Home	*	.843	-.679	-.346
Myrtle Beach	*	-.730	-.587	-.324
Patrick		-.135	1.311	2.290
Plattsburgh		-1.230	-.941	-.846
Reese	*	-.970	-.849	-.533
Robins		1.256	1.919	.923
Seymour Johnson		1.689	1.287	1.834
Williams	*	.046	.538	.068
Wurtsmith		-.863	-1.095	-1.121

* Hospitals within $\pm$ 1 standard deviation.

TABLE 5

Final Population

Hospitals	Operating Beds Authorized
Altus	25
Blytheville	25
Castle	30
England *	20
F. E. Warren	25
George	25
K. I. Sawyer	25
Moody	25
Mt. Home	30
Myrtle Beach	20
Reese	20
Williams	25

* Due to lack of necessary data, England was eliminated from the research project.

whole and account for the expenditure of medical supplies were defined. As was mentioned earlier, reviews of a variety of sources were conducted before the most appropriate productivity factors were defined. Additionally, examinations of the Report of Patients Program (AFM 168-695, Vol I; AFR 168-4) and the Uniform Chart of Accounts Program (DOD 6010.10-M) were performed. The Report of Patients Program proved to be an excellent source of data and was used extensively. The Uniform Chart of Accounts Program could not be used because direct and indirect costs were figured into the unit costs and medical supply costs could not be extrapolated for use in this project. However, from the Uniform Chart of Accounts Program and the literature reviewed, several productivity factors were selected as most significant. These were bed days occupied, outpatient visits, and total prescriptions dispensed (see Appendix B for operational definitions). The following review provides the rationale for each factor chosen.

In determining bed days as a significant factor the major premise for its inclusion was its obvious role as one of the main functions provided by the hospitals and therefore, a significant percentage of medical supply costs could be attributed to number of bed days.

This same rationale was used for including outpatient visits as a crucial productivity factor. A large portion of supply costs are expended in supporting outpatient visits and it, too, is one of the major services provided by the hospital.

To confirm the rationale for choosing occupied bed days and outpatient visits as productivity factors, an analysis of K. I. Sawyer's individual cost centers was conducted using FY 82 medical

supply costs. (Due to the lack of data, an analysis of all hospitals was not possible.) All of the cost centers, excluding the pharmacy, were categorized into inpatient or outpatient categories based on the services each provided. For those cost centers that provided both inpatient and outpatient services (i.e., x-ray, laboratory, physical therapy), a percentage of each type of service was obtained by using FY 82 productivity data provided by the Report of Patients System and applied accordingly to the costs. This analysis revealed that approximately 50 percent of the medical supply costs, excluding the pharmacy's costs, were related to inpatient services, occupied bed days, and approximately 50 percent were related to outpatient services, outpatient visits. Therefore, the rationale for choosing the above two factors was confirmed. However, since both were approximately equal, when subsequent analysis was conducted (i.e., unit costs), total amounts were used and were not divided by two.

Although it was felt that prescriptions were also responsible for a large portion of the medical supply costs, an analysis of all hospitals was done to confirm this fact and those figures are shown here:

	Fiscal Year 1982		
	Total 604	Pharmacy	Percent*
All Hospital Populations	$8,092,800	$3,918,700	48.42
Populations without K. I. Sawyer	$7,592,100	$3,705,400	48.81

* Percent of total 604 spent in the pharmacy.

As was readily apparent, pharmacy costs were extremely significant. Therefore, with the large percentage each of these factors represented of the total medical supply costs these factors were considered to be the best suited for the purposes of this research.

Criteria Established

The next step was to establish the criteria as to the efficiency standards that the data collected would be compared against. These efficiency standards were based on qualitative judgments in terms of what an efficient system should or should not be. The standards were based on such considerations as the rate of inflation for medical costs in general, as well as the net change in total expenditures for FY 82, and increases and/or decreases in the selected productivity factors for population hospitals. The following standards represent the specific ones used to evaluate the results of the data obtained in the research project.

1. The total EEIC 604 costs must be less than or equal to the average total EEIC 604 costs of a group or population of like hospitals.

2. The pharmacy EEIC 604 costs must be less than or equal to the average pharmacy EEIC 604 costs of a group or population of like hospitals.

3. The all medical care commodities EEIC 604 costs must be less than or equal to the average all medical care commodities EEIC 604 costs of a group or population of like hospitals.

4. The percentage increase/decrease in total EEIC 604 costs from one fiscal year to another must be less than or equal to the average percentage increase/decrease of total EEIC 604 costs for a group or population of like hospitals for that same period.

5. The percentage increase/decrease in pharmacy EEIC 604 costs from one fiscal year to another must be less than or equal to the average percentage increase/decrease of pharmacy EEIC 604 costs for a group or population of like hopitals for that same period.

6. The percentage increase/decrease in all medical care commodities EEIC 604 costs from one fiscal year to another must be less than or equal to the average percentage increase/decrease of all medical care commodities EEIC 604 costs for a group or population of like hospitals for that same period.

7. The percentage increase in pharmacy EEIC 604 costs from one fiscal year to another must be less than or equal to the prescription drugs inflation rate as measured by the medical care component of the consumer price index for all urban consumers for that same period.

8. The percentage increase in all medical care commodities EEIC 604 costs from one fiscal year to another must be less than or equal to the all medical care commodities inflation rate as measured by the medical care component of the consumer price index for all urban consumers for that same period.

9. The EEIC 604 occupied bed days unit cost must be less than or equal to the average EEIC 604 occupied bed days unit cost of a group or population of like hospitals.

10. The EEIC 604 outpatient visits unit cost must be less than or equal to the average EEIC 604 outpatient visits unit cost of a group or population of like hospitals.

11. The EEIC 604 prescriptions dispensed unit cost be must less than or equal to the average EEIC 604 prescriptions dispensed unit cost of a group or population of like hospitals.

12. The EEIC 604 occupied bed days unit cost percentage increase/decrease from one fiscal year to another must be less than or equal to the average EEIC 604 occupied bed days unit cost for a group or population of like hospitals for that same period.

13. The EEIC 604 outpatient visits unit cost percentage increase/decrease from one fiscal year to another must be less than or equal to the average EEIC 604 outpatient visits percentage increase/decrease for a group or population of like hospitals for that same period.

14. The EEIC 604 prescriptions dispensed unit cost percentage increase/decrease from one fiscal year to another must be less than or equal to the average EEIC 604 prescriptions dispensed percentage increase/decrease for a group or population of like hospitals for that same period.

15. The percentage increase in the pharmacy EEIC 604 unit cost from one fiscal year to another must be less than or equal to the prescription drugs inflation rate as measured by the medical care component of the consumer price index for all urban consumers for that same period.

16. The percentage increase in the occupied bed days EEIC 604 unit cost and the outpatient visits EEIC 604 unit cost from one fiscal year to another must each be less than or equal to the all medical care commodities inflation rate as measured by the medical care component of the consumer price index for all consumers for that same period.

Data Collection

Two kinds of data were collected for this research project -- expenditure figures and productivity levels. The expenditure figures were extracted from various reports compiled and maintained as a result of Air Force Planning, Program, and Budget System requirements. The productivity figures used were obtained from reports required by the Air Force Medical Service's Report of Patients Program. In all, the data were obtained form the five following sources:

1. Manpower Division
   Directorate of Medical Plans and Resources
   Office of the Surgeon General
   (HQ USAF/SGHM, Bolling AFB DC)

2. Biometrics Division
   Directorate of Health Care Support
   Office of the Surgeon General
   (HQ AFMSC/SGSB, Brooks AFB TX)

3. Logistics Division
   Directorate of Health Care Support
   Office of the Surgeon General
   (HQ AFMSC/SGSL, Brooks AFB TX)

4. Medical Resource Management Office
   (USAF Hospital, K. I. Sawyer/SGM
   K. I. Sawyer AFB MI)

5. Individual Hospital Resource Management Offices and Base Accounting and Finance Budget and Accounts Control Offices of the population considered

The 1 January 83 USAF Fixed Medical Treatment Facilities report was obtained from HQ USAF/SGHM and used in defining the population. The productivity data needed to define the population were compiled from the Report of Patients RCS: HAF-SGS (M7118) report by AFMSC/SGSB. To further define the productivity factors used in this study, the USAF Hospital, K. I. Sawyer/SGM office provided productivity data from their monthly report of patients reports and the individual cost centers.

Next, end-of-year FY 82 expenditure figures were gathered. The total EEIC 604 expenditures for the population hospitals were obtained from AFMSC/SGSL, who obtained the data from the MAJCOM Resource Management Offices' Monthly Financial Status Reports. Base level Medical Resource Management Offices and Base Accounting and Finance Budget and Accounts Control Offices were contacted for the pharmacy costs which were taken from end-of-year FY 81 and FY 82 Operating Budget Ledgers.

Computations and Comparisons

Once having defined the population and productivity factors to use for comparison purposes and having collected the relevant data, analysis of the data and comparisons of the results in relationship to the established criteria were conducted. The conclusions made from these comparisons were drawn and the results are presented in Chapter IV.

Because the inflation rate (see Table 6) is measured in terms of all medical commodities and prescription drugs for medical supplies

TABLE 6

Medical Care Commodities Consumer Price Index
for All Urban Consumers for FY 82

Year	Month	All Medical Care Commodities	Prescription Drugs
1981	September	190.8	176.5
	October	192.1	178.6
	November	193.1	179.6
	December	194.9	181.0
1982	January	195.9	181.9
	February	197.7	183.7
	March	200.0	186.1
	April	202.4	188.8
	May	204.1	190.4
	June	205.6	191.8
	July	206.5	193.4
	August	208.2	195.6
	September	209.9	197.2
	Inflation Rate	10.01	11.73

the total EEIC 604 pharmacy expenditures for FY 81 and FY 82 were subtracted from the total EEIC 604 expenditures to obtain the all medical care commodities expenditure amounts (see Tables 7 and 8).

$$TC - PC = CC$$

where

TC = total EEIC 604 costs

PC = total EEIC 604 pharmacy costs

CC = total EEIC 604 all medical care commodities costs

For example, for Altus Hospital for FY 82:

$$\$669.4 - \$340.0 = \$359.4$$

An overall average was then obtained for each cost (TC, PC, and CC) for each fiscal year inclusive and exclusive of K. I. Sawyer's costs (see Table 9).

$$\sum TC \div N = ATC$$

where

$\sum TC$ = sum of the total EEIC 604 costs for the population

N = 11 with K. I. Sawyer's costs included; and,
10 without K. I. Sawyer's costs included

ATC = average total cost

For example, the ATC for FY 82 including K. I. Sawyer's costs:

$$\$8,092.7 \div 11 = \$735.7$$

Using these computations, a comparison of K. I. Sawyer's three costs to the ATC's of the three costs were also made. The percentage increases/decreases from FY 81 to FY 82 were then calculated for each of the three costs for each hospital respectively (see Table 9).

TABLE 7

Medical Supply Costs for FY 81

Hospitals	Total Costs	Pharmacy Costs	Commodities Costs
Altus	$ 660.2	$ 276.2	$ 384.0
Blytheville	621.5	269.3	352.2
Castle	786.4	429.6	356.8
F. E. Warren	566.0	259.7	306.3
George	897.8	363.6	534.2
K. I. Sawyer	505.6	211.8	293.8
Moody	687.5	366.9	320.6
Mt. Home	628.9	275.0	353.9
Myrtle Beach	565.1	195.3	369.8
Reese	442.5	205.5	237.0
Williams	819.9	427.7	392.2
Including K. I. Sawyer's Data:			
μ	$ 652.9	$ 298.2	$ 354.6
Excluding K. I. Sawyer's Data:			
μ	$ 667.6	$ 306.9	$ 360.7

Note: Costs are in thousands.

TABLE 8

Medical Supply Costs for FY 82

Hospitals	Total Costs	Pharmacy Costs	Commodities Costs
Altus	$ 699.4	$ 340.0	$ 359.4
Blytheville	693.5	338.2	355.3
Castle	936.0	498.6	437.4
F. E. Warren	654.1	313.5	340.6
George	838.5	340.5	498.0
K. I. Sawyer	500.7	213.3	287.4
Moody	762.3	397.2	365.1
Mt. Home	765.4	311.6	453.8
Myrtle Beach	640.3	329.5	310.8
Reese	548.8	247.5	301.3
Williams	1,053.8	588.8	465.0
Including K. I. Sawyer's Data:			
μ	$ 735.7	$ 356.2	$ 379.5
Excluding K. I. Sawyer's Data:			
μ	$ 759.2	$ 370.5	$ 388.7

Note: Costs are in thousands.

TABLE 9

Percentage Increase/Decrease in Medical Supply Costs
from FY 81 to FY 82

Hospitals	Total Costs	Pharmacy Costs	Commodities Costs
Altus	5.94	23.10	-6.40
Blytheville	11.58	25.58	.88
Castle	19.02	16.06	22.59
F. E. Warren	15.57	20.72	11.20
George	-6.61	-6.35	-6.78
K. I. Sawyer	-.97	.71	-2.18
Moody	10.88	8.26	13.88
Mt. Home	21.70	13.31	28.23
Myrtle Beach	13.31	68.71	-15.95
Reese	24.02	20.44	27.13
Williams	28.53	37.67	18.56
Including K. I. Sawyer's Data:			
μ	12.68	19.45	7.02
Excluding K. I. Sawyer's Data:			
μ	13.72	20.72	7.76

$$82\ C \div 81\ C \times 100 - 100 = \pm\%$$

where

82 C = costs for FY 82

81 C = costs for FY 81

$\pm\%$ = percentage of cost increase/decrease from FY 81 to FY 82

For example, for Altus' total EEIC 604 costs:

$$\$699.4 \div \$660.4 \times 100 - 100 = 5.94\%$$

Once again, the overall population average percentage increases/decreases from FY 81 to FY 82 for each of the three costs including and excluding K. I. Sawyer's costs was calculated:

$$82\ ATC \div 81\ ATC \times 100 - 100 = \pm\%$$

where

82 ATC = FY 82 average total cost for the population

81 ATC = FY 81 average total cost for the population

$\pm\%$ = average percentage cost increase/decrease in the population total costs

For example, the population average $\pm\%$ for TC inclusive of K. I. Sawyer's data:

$$\$735.7 \div \$652.9 \times 100 - 100 = 12.68\%$$

Using the results of the previous two calculations, comparisons of K. I. Sawyer's average percentage increase/decrease in PC and CC from FY 81 to FY 82 against the PC and CC average percentage increase/decrease of the overall population for the same period were made. Also, comparisons were made between K. I. Sawyer's PC and CC average percentage increases/decreases from FY 81 to FY 82 against the

prescription drug and all medical commodities inflation rates for that same period.

At this point, population averages for each of the three productivity factors were derived for FY 81 and FY 82 both inclusive and exclusive of K. I. Sawyer's data (see Tables 10 and 11).

$$\sum PF \div N = AP$$

where

$\sum PF$ = sum of population's productivity levels

N = 11 inclusive of K. I. Sawyer's productivity levels; and, 10 exclusive of K. I. Sawyer's productivity levels

AP = average population productivity levels

For example, for FY 82 outpatient visits including K. I. Sawyer's data:

$$\$1,045,935 \div 11 = 95,085$$

Next, the average percentage increase/decrease from FY 81 to FY 82 for each of the three productivity factors for each hospital as well as an overall population average increase/decrease from FY 81 to FY 82 for each of the three productivity factors were computed (see Table 12).

$$82\ PF \div 81\ PF \times 100 - 100 = \pm\%$$

$$82\ APF \div 81\ APF \times 100 - 100 = \pm\%$$

where

82 PF = FY 82 productivity factor levels

81 PF = FY 81 productivity factor levels

82 APF = FY 82 average population productivity factor levels

81 APF = FY 81 average population productivity factor levels

TABLE 10

Productivity Factors for FY 81

Hospitals	Occupied Bed Days	Outpatient Visits	Prescriptions Dispensed
Altus	6,272	93,352	122,419
Blytheville	6,039	78,527	112,919
Castle	6,212	116,604	175,890
F. E. Warren	7,856	96,025	111,045
George	9,173	122,281	167,950
K. I. Sawyer	5,599	78,902	104,975
Moody	6,628	91,013	149,563
Mt. Home	6,925	85,284	136,280
Myrtle Beach	4,732	84,371	140,543
Reese	4,381	77,499	96,021
Williams	5,370	110,489	163,580
Including K. I. Sawyer's Data:			
μ	6,290	94,032	134,653
Excluding K. I. Sawyer's Data:			
μ	6,359	95,545	137,621

TABLE 11

Productivity Factors for FY 82

Hospitals	Occupied Bed Days	Outpatient Visits	Prescriptions Dispensed
Altus	5,877	94,746	128,078
Blytheville	5,498	77,857	114,987
Castle	7,018	126,248	197,345
F. E. Warren	6,841	93,880	105,429
George	6,840	121,990	157,553
K. I. Sawyer	6,264	84,020	99,894
Moody	5,959	83,849	161,347
Mt. Home	7,070	82,524	144,641
Myrtle Beach	5,094	85,204	146,463
Reese	4,793	77,568	129,567
Williams	6,069	118,052	178,169
Including K. I. Sawyer's Data:			
μ	6,120	95,085	133,043
Excluding K. I. Sawyer's Data:			
μ	6,106	96,192	136,358

TABLE 12

Percentage Increase/Decrease in Productivity Levels
from FY 81 to FY 82

Hospitals	Occupied Bed Days	Outpatient Visits	Prescriptions Dispensed
Altus	-6.30	1.49	4.62
Blytheville	-8.96	-.85	1.83
Castle	12.97	8.27	12.20
F. E. Warren	-12.92	-2.23	-5.06
George	-25.43	-.24	-6.19
K. I. Sawyer	11.88	6.49	-4.84
Moody	-10.09	-7.87	7.88
Mt. Home	2.09	-3.24	6.14
Myrtle Beach	7.65	.99	4.21
Reese	9.40	.09	34.94
Williams	13.02	6.85	8.92
Including K. I. Sawyer's Data:			
μ	-2.70	1.12	-1.20
Excluding K. I. Sawyer's Data:			
μ	-3.98	.68	-.92

For example, for Altus' outpatient visits:

$$94{,}746 \div 93{,}352 \times 100 - 100 = 1.49\%$$

and for the populations average outpatient visits:

$$94{,}032 \div 95{,}085 \times 100 - 100 = 1.12\%$$

From these calculations, comparisons were made between the percentage increases/decreases in each of the costs and the percentage increases/decreases in each of the respective productivity factors.

Following the above comparisons, unit costs were derived for each of the three productivity factors for each fiscal year as follows (see Tables 7, 8, 10, and 11):

$$CC \div BD = BD\ UC$$

$$CC \div OV = OV\ UC$$

$$PC \div PD = PD\ UC$$

where

BD = occupied bed days

OV = outpatient visits

PD = prescriptions dispensed

UC = unit cost

For example, for Altus' FY 82 occupied bed days unit cost:

$$\$359{,}400 \div 5{,}877 = \$61.15$$

An overall average population unit cost for each fiscal year and each productivity factor was also derived both inclusive and exclusive of K. I. Sawyer's data (see Tables 7, 8, 10, and 11).

$$ACC \div ABD = ABD\ UC$$

$$ACC \div AOV = AOV\ UC$$

$$APC \div APD = APD\ UC$$

where

ACC = average all medical care commodities costs for the population

APC = average prescriptions dispensed costs for the population

AOV = average outpatient visits for the population

APD = average prescriptions dispensed for the population

For example, for FY 82 occupied bed days including K. I. Sawyer's data:

$$\$379,500 \div 6,120 = \$62.01$$

K. I. Sawyer's unit costs were then compared against the population's unit costs for each of the three productivity factors. Next, percentage increases/decreases for each of the three unit costs were calculated as well as an overall population average unit cost for each of the three productivity factors inclusive and exclusive of K. I. Sawyer's data (see Tables 13, 14, and 15).

$$82\ UC \div 81\ UC \times 100 - 100 = \pm\%$$

$$82\ AUC \div 81\ AUC \times 100 - 100 = \pm\%$$

where

82 UC = FY 82 unit cost

81 UC = FY 81 unit cost

82 AUC = FY 82 average unit cost of the population

81 AUC = FY 81 average unit cost of the population

$\pm\%$ = percentage increases/decreases in unit costs from FY 81 to FY 82

For example, for Altus' occupied bed days unit cost:

$$\$61.15 \div \$61.22 \times 100 - 100 = -.11\%$$

TABLE 13

Unit Costs for FY 81

Hospitals	Occupied Bed Days	Outpatient Visits	Prescriptions Dispensed
Altus	$ 61.22	$ 4.11	$ 2.26
Blytheville	58.32	4.49	2.38
Castle	57.44	3.06	2.44
F. E. Warren	38.99	3.19	2.34
George	58.24	4.37	2.16
K. I. Sawyer	52.47	3.72	2.02
Moody	48.37	3.52	2.45
Mt. Home	51.10	4.15	2.02
Myrtle Beach	78.15	4.38	1.39
Reese	54.10	3.06	2.14
Williams	73.04	3.55	2.61
Including K. I. Sawyer's Data:			
μ	$ 56.38	$ 3.77	$ 2.21
Excluding K. I. Sawyer's Data:			
μ	$ 56.72	$ 3.78	$ 2.23

TABLE 14

Unit Costs for FY 82

Hospitals	Occupied Bed Days	Outpatient Visits	Prescriptions Dispensed
Altus	$ 61.15	$ 3.79	$ 2.65
Blytheville	64.62	4.56	2.94
Castle	62.33	3.46	2.53
F. E. Warren	49.79	3.63	2.97
George	72.81	4.08	2.16
K. I. Sawyer	45.88	3.42	2.14
Moody	61.27	4.35	2.46
Mt. Home	64.19	5.50	2.15
Myrtle Beach	61.01	3.65	2.25
Reese	62.86	3.88	1.91
Williams	76.62	3.94	3.30
Including K. I. Sawyer's Data:			
μ	$ 62.01	$ 3.99	$ 2.68
Excluding K. I. Sawyer's Data:			
μ	$ 63.66	$ 4.04	$ 2.72

TABLE 15

Percentage Increase/Decrease in Unit Costs
from FY 81 to FY 82

Hospitals	Occupied Bed Days	Outpatient Visits	Prescriptions Dispensed
Altus	-.11	-7.79	17.26
Blytheville	10.80	1.56	23.53
Castle	8.51	13.07	3.69
F. E. Warren	27.70	13.79	26.92
George	25.02	-6.64	-0-
K. I. Sawyer	-12.56	-8.06	5.94
Moody	26.67	23.58	.41
Mt. Home	25.62	32.53	6.44
Myrtle Beach	-21.93	-16.67	61.87
Reese	16.19	26.80	-10.75
Williams	4.90	10.99	26.44
Including K. I. Sawyer's Data:			
μ	9.99	5.84	21.27
Excluding K. I. Sawyer's Data:			
μ	12.24	6.88	21.97

and for the populations average unit cost for occupied bed days exclusive of K. I. Sawyer's data:

$$\$63.66 \div \$56.72 \times 100 - 100 = 12.24\%$$

Three basic comparisons were then made. First, K. I. Sawyer's percentage increases/decreases from FY 81 to FY 82 were compared against the populations average percentage increases/decreases for each of the three unit costs for that same period. Second, K. I. Sawyer's PD unit cost percentage increase from FY 81 to FY 82 was compared against the prescription drug inflation factor for that same period. Third, K. I. Sawyer's BD unit cost and OV unit cost percentage decreases were compared against the all medical care commodities inflation rate for that same period.

Lastly, a K. I. Sawyer efficiency rating was obtained to determine how much more or less the K. I. Sawyer's unit costs were as compared to the other hospitals' same unit costs for both FY 81 and FY 82 (see Tables 14, 15, 16, and 17).

$$\text{KI UC} \div \text{XUC} \times 100 - 100 = \pm\%$$

where

KI UC = K. I. Sawyer's unit cost

XUC = base X's unit cost

$\pm\%$ = percentage of how much more or less K. I. Sawyer's unit cost was as compared to base X's unit cost

For example, for K. I. Sawyer's OB UC and that of Altus for 1982:

$$\$61.15 \div \$45.88 \times 100 - 100 = -24.97\%$$

TABLE 16

K. I. Sawyer's Unit Costs Percentages Above/Below the Individual Hospital's Unit Costs for FY 81

Hospitals	Occupied Bed Days	Outpatient Visits	Prescriptions Dispensed
Altus	-14.29	-9.49	-10.62
Blytheville	-10.03	-17.15	-15.13
Castle	-8.65	21.57	-17.21
F. E. Warren	34.57	16.61	-13.68
George	-9.91	-14.87	-6.48
K. I. Sawyer			
Moody	8.48	5.68	-17.55
Mt. Home	2.68	-10.36	-0-
Myrtle Beach	-32.86	-15.07	45.32
Reese	-3.01	21.57	-5.61
Williams	-28.16	4.79	-22.61
μ	-7.49	-1.59	-9.42

TABLE 17

K. I. Sawyer's Unit Costs Percentages Above/Below the Individual Hospital's Unit Costs for FY 82

Hospitals	Occupied Bed Days	Outpatient Visits	Prescriptions Dispensed
Altus	-24.97	-9.76	-19.25
Blytheville	-29.00	-25.00	-27.21
Castle	-26.39	-1.16	-15.42
F. E. Warren	-7.85	-5.79	-27.95
George	-36.99	-16.18	-.93
K. I. Sawyer			
Moody	-25.12	-21.38	-13.01
Mt. Home	-28.52	-37.82	-.47
Myrtle Beach	-24.80	-6.30	-4.89
Reese	-27.01	-11.86	-12.04
Williams	-40.12	-13.20	-35.15
μ	-27.93	-15.35	-21.32

An overall average efficiency rating was also determined for FY 81 and FY 82:

$$\text{KI UC} \div \text{AUC} \times 100 - 100 = \pm\%$$

where

$\pm\%$ = percentage of how much more or less K. I. Sawyer's unit cost was as compared to the populations average unit cost

For example, for FY 82 and the average occupied bed days unit cost exclusive of K. I. Sawyer's data:

$$\$45.88 \div \$63.66 \times 100 - 100 = -27.93\%$$

The final comparison was made by determining the net change in efficiency ratings from FY 81 to FY 82 for each of the three unit costs for each hospital as well as the population average (see Table 18).

TABLE 18

Net Percentage Change in K. I. Sawyer's Unit Costs Above/Below the Individual Hospital's Unit Costs from FY 81 to FY 82

Hospitals	Occupied Bed Days	Outpatient Visits	Prescriptions Dispensed
Altus	-10.68	-.27	-8.63
Blytheville	-18.97	-7.85	-12.08
Castle	-17.74	-22.73	1.79
F. E. Warren	-42.42	-22.40	-14.27
George	-27.08	-1.31	5.55
K. I. Sawyer			
Moody	-33.60	-27.06	4.54
Mt. Home	-31.20	-27.46	-.47
Myrtle Beach	8.06	8.77	-50.21
Reese	-24.00	-33.43	17.65
Williams	-11.96	-17.99	-12.54
μ	-20.44	-13.76	-11.90

IV. Findings and Analysis

Introduction

The purpose of this chapter is to relate the findings and analysis of this research project to the basic research question. To determine if the findings supported the established criteria, they were compared to the criteria. Next, K. I. Sawyer's results, based on the analysis conducted, were judged against the basic premise of the system. K. I. Sawyer's unit costs were also compared directly to those of the individual hospitals as well as the population averages. Lastly, to determine if any other population hospitals were as efficient as K. I. Sawyer, their results were also compared to the criteria.

Criteria

Criteria No. 1: The total EEIC 604 costs must be less than or equal to the average total EEIC 604 costs of a group or population of like hospitals.

Findings and Analysis: In FY 81 and FY 82, K. I. Sawyer was 24.27 percent and 34.05 percent less than the average total EEIC 604 costs of the population used, respectively. On an individual basis, K. I. Sawyer spent less in all cases except for Reese Hospital in FY 81. In FY 81, Reese spent 12.48 percent less than K. I. Sawyer (see Tables 7 and 8).

Criteria No. 2: The pharmacy EEIC 604 costs must be less than or equal to the average pharmacy EEIC 604 costs of a group or population of like hospitals.

Findings and Analysis: In FY 81 and FY 82, K. I. Sawyer was 30.99 percent and 42.43 percent less than the average total pharmacy costs of the population used, respectively. On an individual basis, K. I. Sawyer once again spent less in all cases except for Myrtle Beach and Reese. In FY 81 Myrtle Beach and Reese spent 7.79 percent and 2.97 percent less than K. I. Sawyer, respectively (see Tables 7 and 8).

Criteria No. 3: The all medical care commodities EEIC 604 costs must be less than or equal to the average all medical care commodities EEIC 604 costs of a group or population of like hospitals.

Findings and Analysis: In FY 81 and FY 82, K. I. Sawyer was 18.55 percent and 26.06 percent less than the average all medical care commodities costs of the population used. Once again, on an individual basis, K. I. Sawyer spent less in all cases except for Reese in FY 81. In FY 81, Reese spent 19.33 percent less than K. I. Sawyer (see Tables 7 and 8).

Criteria No. 4: The percentage increase/decrease in total EEIC 604 costs from one fiscal year to another must be less than or equal to the average percentage increase/decrease of total EEIC 604 costs for a group or population of like hospitals for that same period.

Findings and Analysis: From FY 81 to FY 82, K. I. Sawyer decreased .97 percent in total EEIC 604 costs. Whereas, the population average increased 13.72 percent. On an individual basis, K. I. Sawyer's percentage change was less in all cases except for George. George decreased 6.61 percent in total costs during that same period (see Table 9).

Criteria No. 5: The percentage increase/decrease in pharmacy EEIC 604 costs from one fiscal year to another must be less than or equal to the average percentage increase/decrease of pharmacy EEIC 604 costs for a group or population of like hospitals for that same period.

Findings and Analysis: From FY 81 to FY 82, K. I. Sawyer increased .71 percent in pharmacy EEIC 604 costs. Whereas, the population average increased 20.72 percent. On an individual basis, K. I. Sawyer's percentage change was less in all cases except for George, once again. George decreased 6.35 percent in pharmacy costs during that same period (see Table 9).

Criteria No. 6: The percentage increase/decrease in all medical care commodities EEIC 604 costs from one fiscal year to another must be less than or equal to the average percentage increase/decrease of all medical care commodities EEIC 604 costs for a group or population of like hospitals for that same period.

Findings and Analysis: From FY 81 to FY 82, K. I. Sawyer decreased 2.18 percent in all medical care commodities EEIC 604 costs. Whereas, the population average increased 7.76 percent. On an individual basis, K. I. Sawyer's percentage change was less in all cases except for Altus, George, and Myrtle Beach. Altus, George, and Myrtle Beach decreased 6.4 percent, 6.78 percent, and 15.95 percent in all medical care commodities costs during that same period, respectively (see Table 9).

Criteria No. 7: The percentage increase in pharmacy EEIC 604 costs from one fiscal year to another must be less than or equal to the prescription drugs inflation rate as measured by the medical care

component of the consumer price index for all urban consumers for that same period.

Findings and Analysis: The prescription drug inflation rate from FY 81 to FY 82 was an increase of 11.73 percent. Whereas, K. I. Sawyer's percentage change in pharmacy costs was an increase of .71 percent. The population average increased 20.72 percent. On an individual basis, George and Moody were the only two hospitals with percentages less than the prescription drugs inflation rate. George decreased 6.35 percent while Moody increased 8.26 percent (see Tables 6 and 9).

Criteria No. 8: The percentage increase in all medical care commodities EEIC 604 costs from one fiscal year to another must be less than or equal to the all medical care commodities inflation rate as measured by the medical care component of the consumer price index for all urban consumers for that same period.

Findings and Analysis: The all medical care commodities inflation rate from FY 81 to FY 82 was an increase of 10.01 percent. Whereas, K. I. Sawyer's percentage change in all medical care commodities costs was an decrease of 2.18 percent. The population average increased 7.76 percent. On an individual basis, George and Myrtle Beach had percentage changes less than the all medical care commodities inflation rate. Altus, George, and Myrtle Beach decreased 6.4 percent, 6.78 percent, and 15.95 percent, respectively, while Blytheville increased .88 percent (see Tables 6 and 9).

Criteria No. 9: The total EEIC 604 occupied bed days unit cost must be less than or equal to the average total EEIC 604 occupied bed

days unit cost of a group or population of like hospitals.

Findings and Analysis: In FY 81 and FY 82, K. I. Sawyer was 7.49 percent and 27.93 percent less than the average total EEIC 604 occupied bed days unit cost of the population used, respectively. On an individual basis, K. I. Sawyer's occupied bed days unit cost was lower in all cases except for F. E. Warren and Moody in FY 81. In FY 81, F. E. Warren and Moody's occupied bed day unit costs were 25.69 percent and 7.81 percent less than K. I. Sawyer, respectively (see Tables 13 and 14).

Criteria No. 10: The EEIC 604 outpatient visits unit cost must be less than or equal to the average EEIC 604 outpatient visits unit cost of a group or population of like hospitals.

Findings and Analysis: In FY 81 and FY 82, K. I. Sawyer was 1.59 percent and 15.35 percent less than the average EEIC 604 outpatient visits unit cost of the population used, respectively. On an individual basis, K. I. Sawyer's outpatient visits unit cost was lower in all cases except for Castle, F. E. Warren, Moody, Reese, and Williams for FY 81. In FY 81, Castle, F. E. Warren, Moody, Reese, and Williams outpatient visits unit costs were 17.74 percent, 14.25 percent, 5.38 percent, 17.74 percent, and 4.57 percent less than K. I. Sawyer, respectively (see Tables 14 and 15).

Criteria No. 11: The EEIC 604 prescriptions dispensed unit cost must be less than or equal to the average EEIC 604 prescriptions dispensed unit cost of a group or population of like hospitals.

Findings and Analysis: In FY 81 and FY 82, K. I. Sawyer was 9.42 percent and 21.32 percent less than the average EEIC 604 prescriptions

dispensed unit cost of the population used, respectively. On an individual basis, K. I. Sawyer's prescriptions dispensed unit cost was lower in all cases except for Reese in FY 82 and Mt. Home and Myrtle Beach in FY 81. In FY 82, Reese's prescriptions dispensed unit cost was 10.75 percent less than K. I. Sawyer, and in FY 81 Myrtle Beach's unit cost was 31.19 percent less than K. I. Sawyer while Mt. Home's unit cost was equal to that of K. I. Sawyer (see Tables 14 and 15).

Criteria No. 12: The EEIC 604 occupied bed days unit cost percentage increase/decrease from one fiscal year to another must be less than or equal to the average EEIC 604 occupied bed unit cost percentage increase/decrease for a group or population of like hospitals for that same period.

Findings and Analysis: From FY 81 to FY 82, K. I. Sawyer decreased 12.56 percent in occupied bed days unit cost. Whereas, the population average increased 12.24 percent. On an individual basis, K. I. Sawyer's percentage change was less in all cases except for Myrtle Beach. Myrtle Beach decreased 21.93 percent in occupied bed days unit cost during that same period (see Table 15).

Criteria No. 13: The EEIC 604 outpatient visits unit cost percentage increase/decrease from one fiscal year to another must be less than or equal to the average EEIC 604 outpatient visits percentage increase/decrease for a group or population of like hospitals for that same period.

Findings and Analysis: From FY 81 to FY 82, K. I. Sawyer decreased 8.06 percent in outpatient visits unit cost. Whereas, the population average increased 6.88 percent. On an individual basis,

K. I. Sawyer's percentage change was less in all cases except for Myrtle Beach once again. Myrtle Beach decreased 16.67 percent in outpatient visits unit cost during that same period (see Table 15).

Criteria No. 14: The EEIC 604 prescriptions dispensed unit cost percentage increase/decrease from one fiscal year to another must be less than or equal to the average EEIC 604 prescriptions dispensed unit cost percentage increase/decrease for a group or population of like hospitals for that same period.

Findings and Analysis: From FY 81 to FY 82, K. I. Sawyer increased 5.94 percent in prescriptions dispensed unit cost. Whereas, the population average increased 21.97 percent. On an individual basis, K. I. Sawyer's percentage change was less in all cases except for Castle, George, Moody, and Reese. Castle and Moody had increases of 3.69 percent and .41 percent, respectively. George remained even. Reese had a decrease of 10.75 percent in prescriptions dispensed unit cost (see Table 15).

Criteria No. 15: The percentage increase in the pharmacy EEIC 604 unit cost from one fiscal year to another must be less than or equal to the prescription drugs inflation rate as measured by the medical care component of the consumer price index for all urban consumers for that same period.

Findings and Analysis: The prescription drug inflation rate from FY 81 to FY 82 was an increase of 11.73 percent. Whereas, K. I. Sawyer's percentage change in prescriptions dispensed unit cost was an increase of 5.94 percent. The population average increased 21.97. On an individual basis, Castle, George, Moody, Mt. Home, and Reese

had percentage changes less than prescription drugs inflation rate. Castle, Moody, and Mt. Home had increases of 3.69 percent, .41 percent, and 6.44 percent, respectively, while George had no percentage change. Reese decreased 10.75 percent from FY 81 to FY 82 (see Tables 6 and 15).

Criteria No. 16: The percentage increase in the occupied bed days EEIC 604 unit cost and the outpatient visits EEIC 604 unit cost from one fiscal year to another must be less than or equal to the all medical care commodities inflation rate as measured by the medical care component of the consumer price index for all urban consumers for that same period.

Findings and Analysis: The all medical care commodities inflation rate from FY 81 to FY 82 was an increase of 10.01 percent. Whereas, K. I. Sawyer's percentage change in occupied bed days unit cost and outpatient visits unit cost decreased 12.56 percent and 8.06 percent, respectively. The population averages for occupied bed days unit cost and outpatient visits unit cost increased 12.24 percent and 6.88 percent, respectively. On an individual basis for occupied bed days unit cost, Altus, Castle, Myrtle Beach, and Williams had percentage changes less than the all medical care commodities inflation rate. Altus and Myrtle Beach decreased .11 percent and 21.93 percent, respectively, while Castle and Williams increased 8.51 percent and 4.9 percent, respectively. On an individual basis for outpatient visits unit cost Altus, Blytheville, George, and Myrtle Beach had percentage changes less than all medical care commodities inflation rate. Altus, George, and Myrtle Beach decreased 7.79 percent, 6.64 percent, and

16.67 percent, respectively, while Blytheville increased 1.56 percent (see Tables 6 and 15).

Additional Findings and Analysis

In addition to determining the efficiency of the K. I. Sawyer system based on the established criteria, further analysis was conducted. First, the K. I. Sawyer results were compared to the basic premise of the system, that being only when associated workloads increase should total costs increase. Next, K. I. Sawyer's unit costs were directly compared to those of the other individual hospitals and the population's average unit costs to determine if there were any improvements in K. I. Sawyer's unit costs from FY 81 to FY 82 over the unit costs of the other hospitals since K. I. Sawyer's unit costs were already lower than the population's average unit costs for FY 81. Finally, the individual hospital's results were compared against the established criteria to determine if any other hospitals were as efficient based on the established criteria.

Basic Premise. The basic premise of the K. I. Sawyer system, as such, initially excluded any inflation and allowed for an increase in total medical supply costs only when associated workloads increased. The more work cost centers accomplished, the more they were allowed or otherwise expected to spend on medical supplies. Inflation was only taken into consideration after workload changes, unique expenses, and changes in the way in which the cost centers were conducting their business had all been accounted for.

While K. I. Sawyer's occupied bed days and outpatient visits increased 11.88 percent and 6.49 percent, respectively, from FY 81 to FY 82, total all medical care commodities costs decreased 2.18 percent, thereby upholding the basic premise. K. I. Sawyer's prescriptions dispensed decreased 4.84 percent while total pharmacy costs increased .71 percent. However, if the prescription drug inflation rate of 11.73 percent for that same period was to be taken into consideration, it could offset this discrepancy and the basic premise would be upheld.

The population's average occupied bed days and outpatient visits decreased 3.98 percent and increased .68 percent, respectively, from FY 81 to FY 82; whereas the population's average total all medical care commodities costs increased 7.76 percent. If the all medical care commodities inflation rate of 10.01 percent for that same period was to be taken into consideration, it could possibly offset this discrepancy. The population's average prescriptions dispensed decreased 9.20 percent from FY 81 to FY 82 while the population's average total pharmacy costs increased 20.72 percent. Even if the prescription drug inflation rate of 11.73 percent for that same period was to be taken into consideration, it is doubtful that this discrepancy could be offset. Therefore, the population's findings did not uphold the basic premise of the K. I. Sawyer system (see Tables 9 and 12).

A restatement of the basic premise, that being when productivity increases associated medical supply unit costs should decrease, and subsequent analysis revealed the same findings as before. K. I. Sawyer's findings upheld the basic premise except for prescriptions dispensed and the prescriptions dispensed unit cost. Once again,

taking the prescription drug inflation rate into consideration could offset this discrepancy. As for the population's averages, it is once again doubtful that taking the all medical care commodities and prescription drug inflation would offset the discrepancies enough for the population's averages to uphold the basic premise of the K. I. Sawyer system (see Tables 9 and 15).

Unit Cost Comparisons. Since K. I. Sawyer's FY 81 unit costs were lower than the populations's average FY 81 unit costs, comparisons of K. I. Sawyer's unit costs were made to those of the individual hospitals as well as the population's average unit costs to determine how much, if any, K. I. Sawyer's unit costs had improved over the other hospitals' unit costs from FY 81 to FY 82 while under the standard costing system. To do this, K. I. Sawyer's unit costs were divided by those of the individual hospitals as well as the population's average unit costs for both FY 81 and FY 82 to obtain a percentage as to how far K. I. Sawyer's unit costs were above or below the others' unit costs. To determine if K. I. Sawyer's unit costs had improved over the other's, net percentage changes from FY 81 to FY 82 were then calculated (as previously stated in Chapter III). For example, using Altus and occupied bed days (see Tables 16, 17, and 18):

$$(-24.97) - (-14.29) = -10.68$$

Despite K. I. Sawyer's occupied bed days unit cost being 14.29 percent lower than that of Altus in FY 81, it was 10.68 percent lower yet in FY 82. In other words, K. I. Sawyer's unit cost had improved over that of Altus.

Comparison of K. I. Sawyer's unit costs with those of the individual hospitals as well as the population's average unit costs made for FY 81 and FY 82 revealed that on an individual basis some hospitals in one or two unit cost categories were lower than K. I. Sawyer's, but never in all three. For both FY 81 and FY 82, however, K. I. Sawyer's unit costs were lower than the population's average in all three unit cost categories. For FY 81, the occupied bed days, outpatient visits, and prescriptions dispensed percentage differences between K. I. Sawyer's unit costs and the overall population's average unit costs were -7.49 percent, -1.59 percent, and -9.42 percent, respectively. For FY 82, the percentage differences were -27.63 percent, -15.35 percent, and -21.32 percent, respectively. From FY 81 to FY 82, the occupied bed days, outpatient visits, and prescriptions dispensed percentage differences between K. I. Sawyer's unit costs and the population's average unit costs changed -20.44 percent, -13.76 percent, and -11.90 percent, respectively (see Tables 16, 17, and 18). As such, from FY 81 to FY 82 K. I. Sawyer's unit costs improved over those of the population.

Individual Hospital Criteria Comparisons. To determine if any other population hospitals were as efficient as K. I. Sawyer, their results were also compared against the criteria (see Tables 19 and 20). Initially, all criteria were matched against the results of each hospital. While K. I. Sawyer met all 17, no other hospital met all of the criteria; however, Altus did meet 14 of the criteria. Next, since unit costs were more significant for the purposes of this study and to further restrict the bounds of the criteria, only the criteria (9-16b)

TABLE 19

Individual Hospital Comparisons to Criteria

Criteria Levels		Hospitals					
		Altus	Blyth-ville	Castle	F.E. Warren	George	K.I. Sawyer
1.	≤ 735.70	699.40	693.50	936.00	654.10	838.50	500.70
2.	≤ 356.20	340.00	338.20	498.60	313.50	340.50	213.30
3.	≤ 379.50	359.40	355.30	437.40	340.60	498.00	287.40
4.	≤ 12.68	5.94	11.58	19.02	15.57	-6.61	-.97
5.	≤ 19.45	23.10	25.58	16.06	20.72	-6.35	.71
6.	≤ 7.02	-6.40	.88	22.59	11.20	-6.78	-2.18
7.	≤ 11.73	23.10	25.58	16.06	20.72	-6.35	.71
8.	≤ 10.01	-6.40	.88	22.59	11.20	-6.78	-2.18
9.	≤ 62.01	61.15	64.62	62.33	49.79	72.81	45.88
10.	≤ 3.99	3.79	4.56	3.46	3.63	4.08	3.42
11.	≤ 2.68	2.65	2.94	2.53	2.97	2.16	2.14
12.	≤ 9.99	-.11	10.80	8.51	27.70	25.02	-12.56
13.	≤ 5.84	-7.79	1.56	13.07	13.79	-6.64	-8.06
14.	≤ 21.27	17.26	23.53	3.69	26.92	-0-	5.94
15.	≤ 11.73	17.26	23.53	3.69	26.92	-0-	5.94
16a.	≤ 10.01	-.11	10.80	8.51	27.70	25.02	-12.56
16b.	≤ 10.01	-7.79	1.56	13.07	13.79	-6.64	-8.06

TABLE 19 continued

Criteria Levels	Hospitals				
	Moody	Mt. Home	Myrtle Beach	Reese	Warren
1. ≤ 735.70	762.30	765.40	640.30	548.80	1,053.80
2. ≤ 356.20	397.20	311.60	329.50	247.50	588.80
3. ≤ 379.50	365.10	453.80	310.80	301.30	465.00
4. ≤ 12.68	10.88	21.70	13.31	24.02	28.53
5. ≤ 19.45	8.26	13.31	68.71	20.44	37.67
6. ≤ 7.02	13.88	28.23	-15.95	27.13	18.56
7. ≤ 11.73	8.26	13.31	68.71	20.44	37.67
8. ≤ 10.01	13.88	28.23	-15.95	27.13	18.56
9. ≤ 62.01	61.27	64.19	61.01	62.86	76.62
10. ≤ 3.99	4.35	5.50	3.65	3.88	3.94
11. ≤ 2.68	2.46	2.15	2.25	1.91	3.30
12. ≤ 9.99	26.67	25.62	-21.93	16.19	4.90
13. ≤ 5.84	23.58	32.53	-16.67	26.80	10.99
14. ≤ 21.27	.41	6.44	61.87	-10.75	26.44
15. ≤ 11.73	.41	6.44	61.87	-10.75	26.44
16a. ≤ 10.01	26.67	25.62	-21.93	16.19	4.90
16b. ≤ 10.01	23.58	32.53	-16.67	26.80	10.99

TABLE 20

Results of Individual Hospitals when Compared to Criteria

Hospitals	Number of Criteria Met		
	1 - 16b	9 - 16b	9 - 13, 15
Altus	14	8	5
Blytheville	8	2	1
Castle	7	6	4
F. E. Warren	5	2	2
George	11	5	3
K. I. Sawyer	17	9	6
Moody	7	4	3
Mt. Home	5	3	2
Myrtle Beach	12	7	5
Reese	7	4	3
Williams	3	3	2

concerning unit costs were considered. The findings revealed that K. I. Sawyer met all 9 criteria while Altus was once again closest with 8. Finally, in an effort to further analyze the results gathered, the criteria was restricted even further. Since two sets of percentages, one including and the other excluding inflation factors, were used for both all medical care commodities and prescriptions dispensed, those within the set which provided the hospitals with greater latitude to meet the established criteria were eliminated. Once again, K. I. Sawyer met all of the critiera (9-13, 15), while Altus and Myrtle Beach met 5 of the 6. In summary, for all comparisons made, K. I. Sawyer met all of the criteria. Altus was the only other hospital that was relatively as efficient as K. I. Sawyer on the criteria.

V. Conclusions and Implications

Introduction

This chapter presents, in summary, the findings in Chapter IV. After the findings, the authors' conclusions are presented. Implications are given following the authors' conclusions.

Findings

1. The K. I. Sawyer Standard costing system met all established efficiency criteria.

2. On an individual hospital basis, the K. I. Sawyer system was not always the most effective and/or efficient in some cost, productivity, and unit costs comparisons.

3. The K. I. Sawyer system was always, however, more effective and efficient than the population averages in all comparisons.

4. Although the K. I. Sawyer findings did not fully support the basic premise of the system as analyzed (e.g., for prescriptions dispensed, medical supply costs increased .71 percent, while the number of prescriptions dispensed decreased 4.84 percent), the prescription drugs inflation rate (11.73 percent) was not considered. Taking the inflation rate into consideration, it appears K. I. Sawyer did, in fact, support the basic premise.

5. Based on the population and productivity factors used and the established criteria used to define an efficient system, the K. I. Sawyer standard costing system was found to be an efficient system.

6. Even though in FY 81 K. I. Sawyer's costs, productivity, and unit cost were less than the population average in all comparisons, from FY 81 to FY 82 using the K. I. Sawyer standard costing system, K. I. Sawyer became even more effective and efficient comparatively speaking.

7. When comparisons of other hospitals' results were made against the established criteria, Altus was the only hospital that was relatively as efficient as K. I. Sawyer.

Conclusions

Based on population averages the K. I. Sawyer system was a more efficient system. However, on an individual basis the K. I. Sawyer system was not always more efficient in some aspects.

Implications

1. Based on the findings of this research, other hospitals should explore the K. I. Sawyer system's applicability to their own settings. The potential for possible cost savings could be substantial especially when one considers the fact that K. I. Sawyer was already below average and still improved in efficiency.

2. Due to the availability of existing costs and productivity information systems it appears the K. I. Sawyer system could be implemented and operated in minimal time with relative ease.

3. The application of data automation to this system appears feasible and would increase the cost/benefit ratio of operating the system.

4. The orientation of the Resource Management Offices and the individual cost center managers to this system would appear to be the major hurdle in the implementation of the system as well as the continual orientation of new RMO personnel and cost center managers.

5. Equally important as the orientation of the RMOs and the cost center managers is the support of the executive staff. As with any system without executive support the system would be manageable at best.

6. Because the K. I. Sawyer system in the form in which it has been presented had only been in operation for one complete fiscal year, further study is indicated.

Appendix A: EEIC 604 Medical Supply Cost Center Management System

1. System Development:

a. Make a list of all cost centers (EEIC 604 Cost Center sheet, (Atch 1).

b. Get with each cost center manager and determine an appropriate workload factor to use as a basis for determining their medical supply earnings and expenditures (Atch 1). NOTE: If there is no workload factor that best represents a particular cost center's medical supply expenditures, this monitoring system will not apply; however, a straight-line method can be used in conjunction with this system.

c. Determine the best workload factor source for each cost center (Atch 1).

d. Obtain as much medical supply expenses and workload historical data as possible and fill out an EEIC 604 Factor Worksheet (Atch 2) on each cost center for each factor (Expenses and Workload).

e. Using the data from the EEIC 604 (Expenses and Workload) Factor Worksheets (Atch 2), compute the unit costs (Expenses ÷ Workload = Unit Cost) and fill out an EEIC 604 (Unit Costs) Factor Worksheet (Atch 2) on each cost center.

f. Using the data from all three EEIC 604 (Expenses/Workload/Unit Costs) Factor Worksheets (Atch 2), get with each cost center manager and agree on a cumulative unit cost.

2. System Operations:

a. On a quarterly/monthly basis prior to the next quarter/month:

(1) Send out a Projection of Medical Supply (EEIC 604) Expenses letter (Atch 3) to each cost center.

(2) From the Projection of Medical Supply (EEIC 604) Expenses letter indorsement (Atch 3), load the total projected combined expenses figure into the computer (Project Funds Management Report -- PFMR) as a fund target for each cost center.

b. As soon as possible after the first of each month:

(1) Obtain the expenses figure from the monthly Activity Issue/Turn-In Summary and fill out the EEIC 604 (Expenses) Factor Worksheet (Atch 2) for each cost center.

(2) Fill out an EEIC 604 Cost Center Workload Worksheet (Atch 1).

(3) Transfer the EEIC 604 Cost Center Workload Worksheet for each cost center.

(4) Once again, using the data from the EEIC 604 (Expenses and Workload) Factor Worksheets (Atch 2), compute the unit costs (Expenses ÷ Workload = Unit Cost) and fill in the EEIC 604 (Unit Costs) Factor Worksheet (Atch 2) for each cost center.

(5) Transfer the monthly and cumulative (Year-to-Date) expenses (Dollars Spent) and workload figures from the two EEIC 604 (Expenses and Workload) Factor Worksheets (Atch 2) to an EEIC 604 Cost Center Expenditures Report (Atch 4) for each cost center.

(6) Compare the projected monthly unique expense items listed on the Projection of Medical Supply (EEIC 604) Expenses letter indorsement (Atch 3) against the monthly Activity Issue/Turn-In Summary and fill in the unique dollar figure on the EEIC 604 Cost Center Expenditures Report (Atch 4) for each cost center.

(7) Fill in the projected (Agreed-Upon) unit cost on the EEIC 604 Cost Center Expenditures Report (Atch 4) for each cost center.

(8) For each cost center on the EEIC 604 Cost Center Expenditures Report (Atch 4):

(a) Compute the dollars earned (Actual Workload x Projected (Agreed-Upon) U/C = Dollars Earned).

(b) Compute the expenses variance (Dollars Spent - Unique Dollars ÷ Dollars Earned x 100 - 100 = ±% Expenditure Variance).

(9) Send out Overexpenditure of Medical Supply (EEIC 604) Earnings letters (Atch 5) to those cost centers with an expenditure variance of greater than _____%.

(10) Send out or pass out and discuss at the cost center manager's meeting a monthly Medical Supply (EEIC 604) Earnings/Expenditures letter (Atch 6) to each cost center.

(11) Complete an EEIC 604 (Expenses/Workloads/Unit Costs) Cost Center Report (Atch 7) using the data from the EEIC 604 (Expenses/Workload/Unit Costs) Factor Worksheets (Atch 2) and the EEIC 604 Cost Center Expenditures Report (Atch 4) for each cost center.

(a) Columns a, b, c, f, g, and h are self-explanatory.

(b) Columns d and i are determined by using the following formulas, respectively:

1. a ÷ b x 100 - 100 = d (±%).

2. f ÷ g x 100 - 100 = i (±%).

(c) Columns e and j are determined by using the following formulas, respectively:

1. a ÷ c x 100 - 100 = e (±%).

2. f ÷ h x 100 - 100 = j (±%).

(12) Compare the analysis from the EEIC 604 (Expenses/Workloads/Units costs) Cost Center REports (Atch 7) against the Overexpenditure of Medical Supply (EEIC 604) Earnings letter indorsement (Atch 5) for each applicable cost center.

(a) Get with those cost center managers who do not adequately explain the rationale for their overexpenditures and get to the root of the problem(s).

(b) Make subsequent adjustments to applicable unit costs.

(13) Prepare the EEIC 604 Commander's Report (Atch 8) and forward it along with the overexpenditure letters (Atch 5) to the Clinic/Hospital Administrator and Commander for their review and necessary action.

3. System benefits:

a. How the system benefits the hospital overall:

(1) People become cost conscious and aware of the budget process.

(2) People begin to project/plan ahead.

(3) People become orientated to productivity.

(a) Reporting accuracy increases.

(b) Productivity increases.

(4) It encourages fraud, waste, and abuse prevention.

b. How the system benefits the Resource Management Officer:

(1) It simplifies the entire budget process.

(2) It allows for the control of monies.

(a) It provides proactive as well as retroactive control of monies.

(b) The RMO is no longer at the mercy of the Cost Center Managers.

(3) It allows for Management-by-Exception.

(a) Positive results are rewarded.

(b) Deviations from the standards are challenged.

(4) Justification for additional funds from MAJCOM is easily documented.

EEIC 604 COST CENTER WORKLOAD WORKSHEET

COST CENTER	WORKLOAD	SOURCE
245101 Med/Surg Nursing Unit	Total M/S Bed Days:	Daily Census Worksheet
245131 OB Nursing Unit	Births:	AF Form 235b, Report of Patients, Line 50, Col C
245171 Med/Surg Clinic	Total Clinic Patient Visits:	AF Form 235a, Report of Patients, Lines 89 + 103, Col B
245177 OB/Gyn Clinic	Total Clinic Patient Visits:	AF Form 235a, Report of Patients, Lines 96 + 98 + 106, Col B
245178 -Pediatric Clinic	Total Clinic Patient Visits:	AF Form 235a, Report of Patients, Line 91, Col B
24524A Medical Material		
24524B Medical Material—MEMO		
24524H MEMO Holding		
24524L Local on Loan		
245402 Emergency Services	Total ER Patient Visits:	AF Form 235a, Report of Patients, Line 82, Col B
245403 Flight Medicine Clinic	Total Clinic Patient Visits:	AF Form 235a, Report of Patients, Line 108, Col B
245471 Orthopedic Clinic	Total Clinic Patient Visits:	AF Form 235a, Report of Patients, Line 100, Col B
245484 Mental Health Clinic	Total Clinic Patient Visits:	AF Form 235a, Report of Patients, Line 92, Col B
245491 Primary Care Clinic	Total Clinic Patient Visits:	AF Form 235a, Report of Patients, Line 81, Col B
245492 Physical Exam Clinic	Total Physical Exams:	UCA Data Collection Worksheet
245493 Optometry Clinic	Total Clinic Patient Visits:	AF Form 235a, Report of Patients, Line 107, Col B
245511 Dental Clinic	Total Composite procedures:	AF Form 235e, Report of Patients, Line 19
245513 Dental Laboratory	Total Composite Procedures:	AF Form 235e, Report of Patients, Line 20
245610 Pharmacy	Total Prescriptions Dispensed:	AF Form 235, Report of Patients, Line 71, Col A
245621 Laboratory	Total Laboratory Procedures:	AF Form 235, Report of Patients, Line 70, Col A
245623 Blood Bank		
245631 Radiology	Total X-rays Exposed:	AF Form 235, Report of Patients, Line 56, Col A
245651 Central Sterile Supply	Total Outpatient Visits:	AF Form 235, Report of Patients, Line 21
245652 Central Sterile Services	Total Bed Days:	AF Form 235b, Report of Patients, Line 1, Col D
245661 Recovery Room	Total Operations Performed:	AF Form 235e, Report of Patients, Line 10
245662 Surgical Suite	Total Operations Performed:	AF Form 235e, Report of Patients, Line 10
245664 Physical Therapy	Total Patients Treated:	AF Form 235a, Report of Patients, Line 113, Col B

Atch 1

EEIC: FACTOR:	FY 80	FY 81	FY 82	FY 83	FY 84
October					
November					
Cumulative					
December					
1st Qtr Total					
January					
Cumulative					
February					
Cumulative					
March					
2nd Qtr Total					
2nd Qtr Cum					
April					
Cumulative					
May					
Cumulative					
June					
3rd Qtr Total					
3rd Qtr Cum					
July					
Cumulative					
August					
Cumulative					
Septembe-					
4th Qtr Total					
4th Qtr Cum					

Atch 2

FROM: DEPARTMENT OF THE AIR FORCE
USAF Hospital, K. I. Sawyer (SAC)
K. I. Sawyer Air Force Base MI 49843

REPLY TO ATTN OF: SGM, 214

SUBJECT: Projection of Medical Supply (EEIC 604) Expenses

TO:

1. The workload factor and unit cost used to determine your cost center's medical supply expenses are _____ and $ _____ respectively.

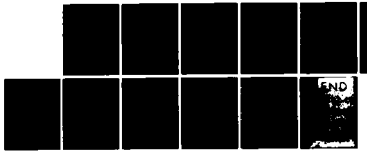
2. Request you furnish this office with monthly routine, unique, and combined medical supply expense projections for the _____ Qtr of FY _____. To do this, fill in the indorsement on the reverse side of this letter and return it to the Resource Management Office no later than _____.

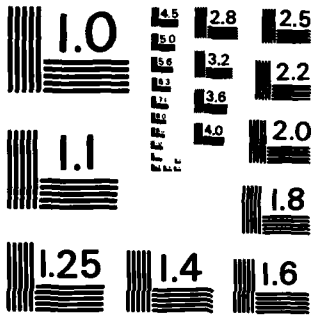
MICHAEL J. OLSON, 1st Lt, USAF, MSC
Director of Medical Resource Management

SG FL-121

Atch 3(a)

AD-A147 665 CONTROLLING MEDICAL SUPPLY COSTS(U) AIR FORCE INST OF 2/2
TECH WRIGHT-PATTERSON AFB OH SCHOOL OF SYSTEMS AND
LOGISTICS B C MERKEL ET AL. SEP 84 AFIT/GLM/LSM/84S-45
UNCLASSIFIED F/G 6/12 NL





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS - 1963 - A

1st Ind,

TO: SGM

My monthly projected medical supply expenses for the _____ Qtr of FY ____ are:

a. Routine:

Month	Projected Workload		Unit Cost		Total Projected Expenses
_____	_____	x	$_____	=	$_____
_____	_____	x	$_____	=	$_____
_____	_____	x	$_____	=	$_____
Total projected routine expenses for the Qtr:					$_____

b. Unique:

Month	Item(s) Required	Estimated Cost(s)	Total Projected Expenses
_____	_____	$_____	
	_____	$_____	
	_____	$_____	$_____
_____	_____	$_____	
	_____	$_____	
	_____	$_____	$_____
_____	_____	$_____	
	_____	$_____	
	_____	$_____	$_____
Total projected unique expenses for the Qtr:			$_____

c. Combined:

Month	Total Projected Routine Expenses		Total Projected Unique Expenses		Total Projected Expenses
_____	$_____	+	$_____	=	$_____
_____	$_____	+	$_____	=	$_____
_____	$_____	+	$_____	=	$_____
Total projected combined expenses for the Qtr:					$_____

Atch 3(b)

EEIC 604 COST CENTER EXPENDITURES

	THIS MONTH						YEAR-TO-DATE					
COST CENTER	DOLLARS SPENT	UNIQUE DOLLARS	ACTUAL WORK LOAD	PROJECTED U/C	DOLLARS EARNED	(DOLLARS SPENT - UNIQUE) $ EARNED $	DOLLARS SPENT	UNIQUE DOLLARS	ACTUAL WORK LOAD	PROJECTED U/C	DOLLARS EARNED	(DOLLARS SPENT - UNIQUE) $ EARNED $
245101												
131												
171												
177												
178												
24A												
24B												
24C												
24E												
24H												
24L												
402												
403												
471												
434												
491												

KIS APR 82 84

Atch 4

FROM: USAF Hospital/SGM

SUBJECT: Overexpenditure of Medical Supply (EEIC 604) Earnings

TO:

A medical supply cost analysis of your cost center for FY _____ shows you have spent $_____or _____% more than you have earned. Rational for this overexpenditure must be determined and satisfactorily explained. Please complete the indorsement below and return it to the Resource Management Office no later than _____.

MARY Z. WHITFIELD, 1Lt, USAF, MSC
Director, Medical Resource Management

1st Ind,

TO: SGM

An examination of my cost center's medical supply expenses for FY _____ has been performed. The following factors contributed to my overexpenditure of earnings:

_____
(Signature)

SC FL# 123

Atch 5

FROM: USAF Hospital/SGM, 214

SUBJECT: Medical Supply (EEIC 604) Earnings/Expenditures

TO:

A medical supply cost analysis of your cost center for _____ and for FY ___ shows the following:

a. For the month:

(1) Dollars spent: $

(2) Dollars earned: $

(3) Expenditure percentage: %

b. Year-to-date:

(1) Dollars spent: $

(2) Dollars earned: $

(3) Expenditure percentage: %

Mary Z. Whitfield

MARY Z. WHITFIELD, 1Lt, USAF, MSC
Director, Medical Resource Management

SG FL# 122

Atch 6

USAF HOSPITAL, K.I. SAWYER EEIC 604 COST CENTER REPORT									MONTH	YEAR
THIS MONTH						YEAR-TO-DATE				
EXPENSES/WORKLOADS/UNIT COSTS				VARIANCES		EXPENSES/WORKLOADS/UNIT COSTS			VARIANCES	
COST CENTER	(a) ACTUAL	(b) PROJECTED	(c) PRIOR FY	(d) PROJECTED	(e) PRIOR FY	(f) ACTUAL	(g) PROJECTED	(h) PRIOR FY	(i) PROJECTED	(j) PRIOR FY
24[illegible]01										
131										
171										
177										
178										
24A										
24B										
24C										
24E										
24H										
24L										
402										
403										
471										
464										

KIS [illegible] 83

Atch 7

EEIC 604 COST CENTER COMMANDER'S REPORT

As Of: 31 Mar 83

	Cost Center	Dollars Spent	Unique Dollars	Dollars Earned	Expenditure Variance %
245101	Med/Surg Nursing Unit	$11,444	$8,199	$ 3,135	+ 3.5
245131	OB Nursing Unit	14,105	3,743	10,152	+ 2.1
245171	Med/Surg Clinic	605		1,298	- 53.4
245177	OB/Gyn Clinic	2,748	150	2,631	- 1.3
245178	Pediatric Clinic	729	356	376	- 0.8
245402	Emergency Services	2,599	1,035	1,675	- 6.6
245403	Flight Medicine	920	604	312	+ 1.3
245471	Orthopedic Clinic	1,590	199	1,454	- 4.3
245484	Mental Health Clinic	26		150	- 82.7
245491	Primary Care Clinic	1,774	1,025	808	- 7.3
245492	Physical Exam Section	783		1,046	- 25.1
245493	Optometry Clinic	379	219	402	- 60.2
245511	Dental Clinic	17,978	4,563	13,810	- 2.9
245513	Dental Lab	1,609		1,525	+ 5.5
245610	Pharmacy	128,206		123,582	+ 3.7
245621	Laboratory	28,262		21,879	+ 29.2
245631	Radiology	13,000	3,594	8,978	+ 4.8
245651	Central Sterile Material	7,205		6,778	+ 6.3
245652	Central Sterile Services	19,925	133	14,786	+ 33.9
245661	Recovery Room	4,485	54	4,480	- 1.1
245662	Surgical Suite	13,855	2,175	8,550	+ 36.6
245684	Physical Therapy	700	49	941	- 30.8
245720	Medical Library	3,017		3,426	- 11.9
245760	Biomedical Equipment Maint	6,627	800	7,056	- 17.4
245770	Linen Services	8,239		7,498	+ 9.9
245781	Food Services	676	11	694	- 4.2
245790	Inpatient Affairs	119		331	- 64.0
245815	Drug Abuse			65	-100.0
245843	Training	105		318	- 67.0
245951	Environmental Health	1,159	810	492	- 13.2
245852	Immunizations Clinic	13,548	8,600	5,094	- 2.9
245854	Veterinary Services	619	506	123	- 8.1
245864	First Aid Kit Section	744		435	+ 71.0
245932	Material for Patient Movement	1,157		1,500	- 22.9
	Totals	$308,937	$36,825	$255,690	+ 6.4 %

Appendix B: Medical Administrative Management System Definitions

The following definitions on what constitutes outpatient visits, pharmacy prescriptions, and inpatient days have been extracted form AFM 168-695, Volume I (C7), Medical Administrative Management System - Base (PA). These are the definitions on which the data used in this research project were based.

1. OUTPATIENT VISITS (p. 2-9):

b. SECTION II - OUTPATIENT AND QUARTERS PATIENT VISITS FOR OBSERVATION, DIAGNOSIS TREATMENT, FLIGHT, OR OTHER "COMPLETE" PHYSICAL EXAMINATION.

(1) Reportable visits:

(a) A visit is considered complete and is countable each time a patient reports to a separate organized clinic or specialty service (see paragraph 2-11a(a) for a full discussion of reportable inpatient visits):

1. Examination, diagnosis, treatment, evaluation, consultation, counseling, or medical advice (see (d) below for example).

2. Treatment or observation in quarters, and a signed and dated entry is made in the patients' health record or other record of medical treatment (see note 1).

(b) Consecutive clinic visits to specialty clinics, that is, Physical Therapy and Occupational Therapy, will not require a signed and dated entry at each visit unless there is a change in prescribed treatment or a significant physical finding is evident.

(c) In all instances, an audit trail must be maintained. (For example, a clinic log or treatment card may be maintained as a source document to support an audit trail.)

(d) Classification of a service as a visit shall not be dependent upon the professional level of the person providing the service (includes physicians, nurses, physicians' assistants, medical specialists, and medical technicians). Further, the definition "occasion of service" (see note 3) must be carefully considered to assure that credit for a visit is not taken if the criteria for "visit" as set forth in note 1 is not met. A patient seen at the Primary Care

Clinic and two other specialty clinics on the same day is reported as three visits. A patient visiting a clinic in the morning and again in the afternoon is counted as two visits (providing the requirements of note 1 are met). These rules apply even if the patient is admitted as an inpatient immediately following a visit. Double counting shall be avoided; for example, a visit during which both a physician and medical technician in the same clinic have been involved shall count as only one visit. Guidance for these situations is in paragraphs 2-11a(4), (b) and (c). Other examples of patient/medical care provider contracts which shall be included and counted as visits are:

1. Each time a patient is seen who has been referred to a clinic or specialty service by another facility. (If the person is an inpatient of the referring facility, count as an outpatient.)

2. Each time a patient is seen, even though referred elsewhere for admission.

3. Each time a patient is seen in the emergency room, primary medical care area, or other designated area outside of regularly established clinic hours.

4. Each time medical advice or consultation is provided by telephone if properly documented in the health care records (see note 1).

5. Each time all or part of a "complete" physical examination or flight physical examination is performed in a separately organized clinic, specialty service or general outpatient clinic. One "complete" physical examination requiring the patient to be examined or evaluated in four different clinics is reported as four visits.

6. Each time a therapist provides primary care (for example, patient assessment while serving in a physician extender role) and then refers a patient for specialized treatment in that same clinic, then one visit for primary care and one visit for treatment shall be counted.

7. Each time an examination, evaluation, or treatment is provided in the home, school, community center, or other location outside of the medical treatment facility by a Health Care Provider employed by the Medical Treatment Facility paid from appropriated funds.

8. Each time one of the following tasks is performed when not a part of routine medical care, and the visit is associated with or related to the treatment of a patient for a specific condition requiring follow-up to a physical examination and the provisions of note 1 are complied with:

a. Therapeutic or desensitization injections.

b. Cancer detection checks; for example, PAP smears.

c. Weight checks.

d. Blood pressure checks.

e. Prescription renewals, but do not include refills.

9. For group therapy sessions, count each patient attending as one visit regardless of the length of the session; when more than one member of the health care team is involved in conducting the group therapy session (example, psychologists, psychiatrists, social workers, dieticians), the visit will be reported for the primary provider, when the provisions of note 1 are satisfied. Conversely, group activity counseling (prospective parents classes, group instructions in first aid and other sessions of this type) will be reported as one visit regardless of the number of participants, when individual treatment, examination, evaluation, or therapy is not provided.

10. Each time a screening physical evaluation is performed and appropriate medical record entry is made, count as one visit. Record each visit to the clinic service that performed the screening evaluation. (Example: School, sport, employment, and other similar evaluations). (See note 1.)

(2) Nonreportable Visits:

(a) Occasions of service such as prescriptions filled by the pharmacy, chest X-ray surveys/examinations, laboratory tests, immunizations, or other diagnostic tests that are not a part of specific treatment.

(b) Furnishing of medical advice or information either directly or by telephone that does not meet the requirements of note 1.

(c) Visits made to a school health program not staffed by armed forces health care personnel are not considered to be visits made to a separate clinic or specialty service. However, dependent children seen by employees of the medical facility, such as public health nurses, are counted as visits (see note 1).

(d) Visits to providers paid from non-appropriated funds must not be included in outpatient workloads which support appropriated fund requirements.

NOTE 1: The key to reporting visits is adequate documentation on appropriate medical records, for example, SF 600, SF 513, OT&PT records

of treatment to support an audit trail. For example, "refill prescriptions for birth control pills" with date and signature of the Health Care Provider is not sufficient. The entry should indicate that discussion of use of pills and counseling did take place, for example, "discussed with patient; no apparent problem with use -- patient advised to have a PE and PAP prior to next request for renewal; six months prescription for Ovulen given.

NOTE 2: Visits of inpatients will be separately identified from visits of outpatients.

NOTE 3: Occasion of service: An identifiable act or service involved in medical care of a patient which does not require assessment of the patient's condition, nor the exercising of independent judgment as to the patient's care; for example, a technician drawing blood, taking an X-ray, or administering an immunization. Issuance of medical supplies and equipment should not be counted as visits. Issuance of prescriptions, pathological, radiological, and special procedural services are occasions of service and are not counted as visits.

2. PHARMACY PRESCRIPTIONS (p. 2-13).

(7) Line 71 - Report number of prescriptions filled by the pharmacy for individual patients and bulk drug orders filled for wards, clinics, or other using activities. Count one for each prescription filled or refilled for individual patients. Count one for each medication which is prepackaged or labeled in the pharmacy for dispensing to wards and clinics. Also count one for each over-the-counter medication issued to clinics for direct dispensing to patients by those physician extenders not authorized to prescribe. For all other issues, count only one for each line on a bulk drug order if the issue does NOT involve prepackaging or labeling by the pharmacy. EXAMPLE:

Line Item	Amount	Count
APC Tabs (10s)	15	15
Tetracycline Inj 0.5 cm I.V.	25	1
Dimetapp Tabs (12s)	30	30
Sod Phosphate - Sod Citrate Sol Disposable Enema	10	1
Actified Syrup, 2 oz	12	12

NOTE: Pharmacies using a unit dose drug distribution system, count 0.1 for each unit dispensed. For each I.V. admixture prepared count 1.5. Round the total to the nearest whole number before entering on line 71.

3. INPATIENT DAYS (p. 2-17):

a. SECTION X - INPATIENT ADMISSIONS AND INPATIENT DAYS. Only Hospitals and medical centers prepare this form for patients who have been admitted as bed occupants.

(1) Do not include patients who remain overnight while enroute to another hospital. However, patients who have reached their destination hospital are no longer considered transient patients; the destination hospital reports these patients as an admission by transfer (column B).

(2) Do not include any patient excused from duty for treatment in quarters. A quarters patient who is later admitted as an inpatient will be counted as an inpatient admission (column A) at that time. Inpatient days will be counted upon admission as an inpatient.

(3) Do not include any patient days spent on leave, AWOL, PCS-HOME, or in a nonmilitary hospital.

(4) Report livebirth as an admission (column A) only when the mother has been discharged from the hospital and the infant remains as a patient. In such a case, the mother's day of discharge is the infant's day of admission. Similarly, the mother's day of discharge and all subsequent days in hospital are bed occupancy days (column D) for the infant. See paragraphs 2-12a(9) and (10) for reporting newborns occupying bassinets or isolettes that have not gone to admission status.

(5) Report in column A all admissions to bed occupancy in your facility, including admissions "from quarters," admissions "by transfer" from other military medical treatment facilities, patients received from nonmilitary facilities, and patients discharged on the day of admission. Do not report patients who were alive on arrival in the emergency room but who died before admission to a bed.

Bibliography

1. Ahrens, James P. and others. "Illinois Study Determines Impact of Treatment Methods on Costs, Productivity," Hospital Financial Management, 34: 36-43 (March 1980).

2. Anthony, Robert N. and David W. Young. Management Control in Nonprofit Organizations. Homewood NJ: Richard D. Irwin, Inc., 1984.

3. Berman, Howard J. and Lewis E. Weeks. The Financial Management of Hospitals (Fifth Edition). Ann Arbor MI: Health Administration Press, 1982.

4. Bisbee, Gerald E., Jr. and Robert A. Vraciu. Managing the Finances of Health Care Organizations. Ann Arbor MI: Health Administration Press, 1980.

5. Cook, J. "Why Medical Costs are Out of Control," Forbes, 131: 104-105 (February 1980).

6. Dearden, John. "Cost Accounting Comes to Service Industries," Harvard Business Review, 56: 132-140 (September/October 1980).

7. Feldbush, Marvin A. "Participative Budgeting in a Hospital Setting," Management Accounting 63: 43-46 (September 1981).

8. "Health Care Costs Top 10% of GNP in 1982," National Underwriter (Life Health Insurance Edition), 87: 55 (July 1978).

9. Herkimer, Allen G., Jr. Understanding Hospital Financial Management. Germantown PA: Aspen Systems Corporation, 1978.

10. Larracey, Susan A. "Hospital Planning for Cost-Effectiveness," Management Accounting, 64: 44-48 (July 1982).

11. "Productivity Measurement: A Management Accounting Challenge," Management Accounting, 61: 24-30 (May 1980).

12. Schlag, Darwin W. "Management Cost Analysis: Keeping the Goals in View," Hospital Financial Management, 34: 56-58 (September 1980).

13. "Sees Pressure from Feds Over Health Costs," National Underwriter (Life Health Insurance Edition), 87: 6 (April 1983).

14. Social Security Administration. Social Security Bulletin, 46 (4). Washington: Government Printing Office, April 1983.

15. Sutton, H. L. "Controlling the Costs of Health Care Where it Counts - From Within the System," Management Review, 70: 48-55 (September 1981).

16. Suver, James D. and F. Theodore Helmer. "Developing Budgetary Models for Greater Hospital Efficiency," Management Accounting, 61: 34-39 (July 1979).

17. Varnoff, S. "Product Liability, Malpractice Cases Jump: Study," Business Insurance, 16: 60-61 (March 1982).

18. Williams, Nicole. The Management of Hospital Employee Productivity: An Introductory Handbook. Chicago IL: American Hospital Association, 1973.

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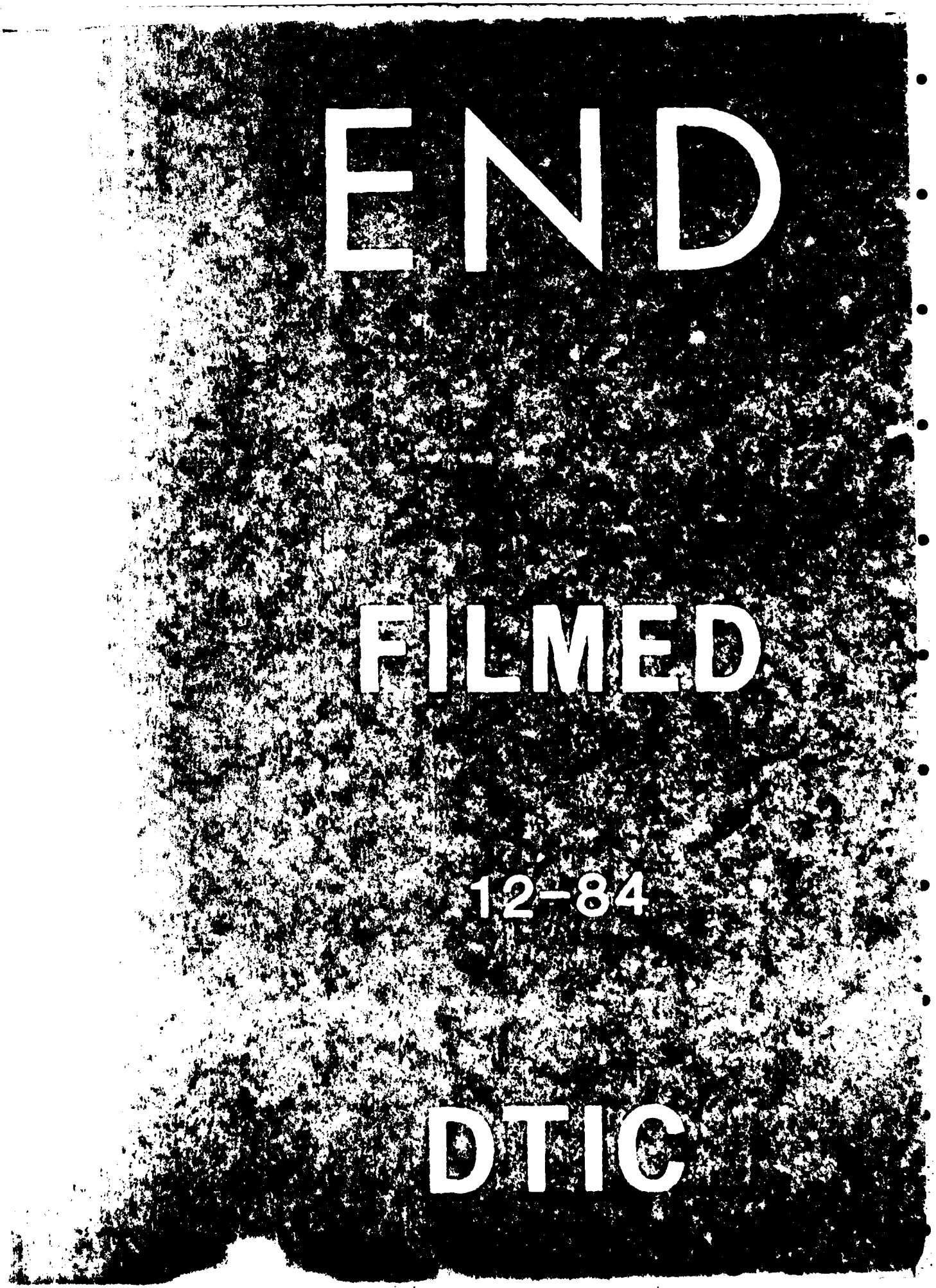
This thesis project investigated the efficiency of a standard costing system used by the USAF Hospital, K. I. Sawyer to control its medical supply costs. This was accomplished by comparing the costs, productivity, and the unit costs associated with the expenditure of medical supplies to those of a population of like medical treatment facilities. The effects of the K. I. Sawyer system were also compared to the medical care component of the consumer price index for all urban consumers in terms of all medical care commodities and prescription drugs.

The analysis was accomplished by defining those productivity factors most representative of the expenditures of medical supplies, defining a population of like hospitals based on the productivity factors selected, and then relating the medical supply costs to the productivity factors. The results of the analysis of the K. I. Sawyer system were then compared against the results of the population average as well as the results of the individual hospitals. Additionally, the results of the K. I. Sawyer system were compared to the inflation rate for the same period.

All of the results of the analysis conducted were obtained to determine whether or not the K. I. Sawyer system was an efficient system based on a set of pre-established criteria defining an efficient system. The findings of this investigation indicate that the K. I. Sawyer system was an efficient system.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